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1956

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NUMBER 10

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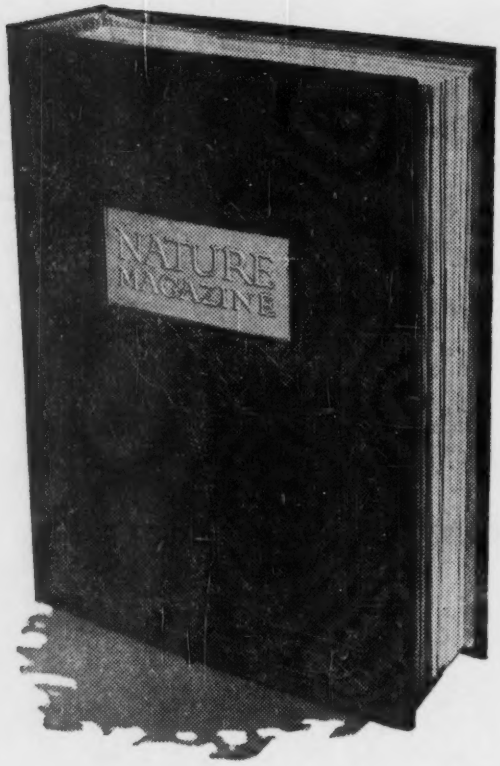

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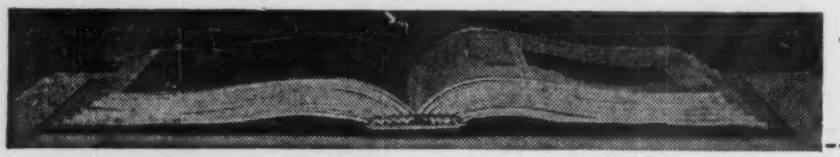

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Reviews

Out of the Wilderness

By Virginia S. Eifert. New York. 1956. Dodd, Mead and Company. 214 pages. Illustrated by Manning deV. Lee. $3.00.

The author of this story of Abraham Lincoln, and those almost forgotten years of his life between 1811 and 1831, is well known to the readers of *Nature Magazine* through her contributions to its pages. An excellent naturalist and able writer in this field, Mrs. Eifert, who has lived all her life in Springfield, Illinois, has devoted deep study to the early days of the Lincoln family and the President who was to be. This is the third book in a trilogy of Lincoln books by Mrs. Eifert, the others being *The Buffalo Trace* and *Three Rivers South*. Together these volumes tell the Lincoln story from 1780 to 1831. The publishers indicate that the audience of this book is in the 11 to 18 age class, but it would seem to us that the area of interest, agewise, might even be to older readers. Mrs. Eifert writes charmingly and accurately, and the Nature interest is ever present in her work.

The Stars by Clock and Fist

By Henry M. Neely. New York. 1956. The Viking Press. 192 pages. Illustrated by 60 sky maps, 24 star lists, 12 time charts and diagrams. $4.00.

Here is a book that is entitled to the adjective "unique" as an introduction to astronomy and a knowledge of the heavens. The author, who is lecturer at the Hayden Planetarium in New York City, has, after long experimentation and compilation, invented a ingenious and new method of star identification. It involves nothing more than an imaginary clock and the human fist, and, of course, the author's charts that make use of these two simple keys to knowledge of the heavens. The method has been tried out with beginner groups and has proved its worth in practical application. The book is applicable anywhere in the United States or southern Canada, and in comparable latitudes elsewhere. It is also useful in navigation and valuable to Boy Scouts and Girl Scouts and to the outdoorsman.

Bears in My Kitchen

By Margaret Merrill. New York. 1956. McGraw-Hill Book Company. 249 pages. $3.95.

Bill Merrill rode horseback twenty-eight miles over a rugged mountain pass to meet Marge, his bride-to-be, in Yosemite Valley, where they were married in 1930. Bill was, and is, a Park Ranger, and his wife was a Chicago girl who was to find happiness, hard work, humor and occasional danger as a ranger's wife. This is their story from her point of view and a warmhearted story it is. They are a rare group, these rangers' wives, and they are just as dedicated to the National Parks as are their husbands. The reader of this book is indebted to one of them for this delightful report of bears in her kitchen, and many other strange experiences.

Glory Days of Logging

By Ralph W. Andrews. Seattle, Washington. 1956. Superior Publishing Company. 176 pages Illustrated. $8.50.

While in the light of present conservation thinking and forestry practice, the old days of logging were woefully destructive of a resource, there was excitement and pioneering in those earlier days. A nostalgic picture of logging and the life of the woodsman of yesterday is provided in this interesting book. To obtain his material, pictorial and factual, the author dug into the files of logging camps and companies, official archives and elsewhere. He has confined himself to the Northwest and the Big Woods of that region and has put together a fascinating record. It is also an interesting tracing of the history of the methods used in the lumber camps and the hardy men who used them.

The Deer of North America

Edited by Walter P. Taylor. Harrisburg, Pa. 1956. The Stackpole Company 668 pages. Illustrated. $12.50.

This authoritative and important book covers the history and management of the white-tailed, mule and black-tailed deer, and is a Wildlife Management Institute publication. A distinguished group of authorities have provided the various chapters, and the noted biologist, Dr. Taylor, has brought these together in a work that will stand as the source book on the genus *Odocoileus* for a long time to come. Long years of study of the species involved form a basis for this book.

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Nature Magazine

DECEMBER, 1956 VOL. 49, NO. 10

Published by the **AMERICAN NATURE ASSOCIATION** to stimulate public interest in every phase of nature and the out-of-doors, and devoted to the practical conservation of the great natural resources of America

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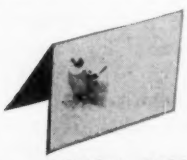

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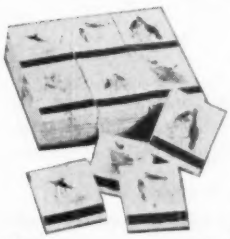

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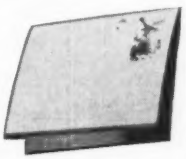

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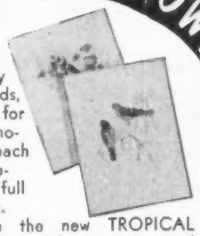

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Nature IN PRINT

By HOWARD ZAHNISER

For Children at Christmas

ONE OF THE GREAT DELIGHTS of the Christmas season comes with the books for children. More and more delightful such books become, as authors and illustrators are inspired to reveal the interest and wonder in the world and the joy—the fun—of knowing. After nearly half a century of enjoyment and excitement in reading and beholding such children's books I am surmising that there is no growing up at all beyond such pleasures—the pleasure, that is, in a real, good book for children. And that must be because a real, good book for children deals simply, honestly, imaginatively with its readers and deals directly with them, too. So varied are the wonders of the world, so intricate are its marvels that it seems hardly possible that ever one could grow beyond that best part of childhood which is the delight of knowing something new for the very first time. Certainly through many years of avid reading I myself have never yet come to a time when the shelves of new books for children did not hold for me revelation, information, and the amusement—or, no, the ravishment—of having curiosity and wonder roused and then relieved. And I suspect that many adults at Christmas time—and year-round too—are missing much enjoyment that they might well know, missing it because they take no time for children's books.

The Story of Caves that Dorothy Sterling tells for eight to twelve year olds, and Winifred Lubell pictures with her woodblock prints with color came by chance to my eyes this fall of 1956, published on September 20, just as I had started to read an outstandingly excellent volume on caves, newly written for adults by a competent authority. Perhaps otherwise I would not have examined the children's book, which as it happened I read instead. Certainly I shall still read also the "adult" book, for I am concerned to know about caves, but I surmise that I shall thereafter have a much, much better knowledge and understanding of caves because I have first read Dorothy Sterling's story for children.

Life and living in caves

Mrs. Sterling's story is a thorough one, comprehending description and classification of caves and caverns, recollection of the cave men, accounts of the formation of caves, the "life" of the cave itself, and the life that lives within caves. She is not only interested in caves, but is pleased with them. In a final chapter called "Mountain Climbing Underground" she tells of the adventure and recreation and study interest in caves, and lists a hundred caves that can be visited. Winifred Lubell effectively and delightfully illustrates her author's text. Her woodblock prints, printed with colors, have an interest and pleasure of their own, as, indeed, pictures by artists should have, and she not only shows what the text means but charmingly takes an attitude. I am grateful for the experience I have had this fall of making, as it were, a child's entrance into caves.

This experience has made me wonder: Could we not always best approach any subject along the paths that children follow? Again and again, I remember, in using the encyclopedia I have approached *Britannica* by way of *The World Book*. Thinking of Christmas, I recall too that Jesus declared that "whoever does not receive the kingdom of God like a child shall not enter in."

America's Natural Wonders: Strange Forests, Mysterious Caverns, and Amazing Formations, by C. B. Colby, came to me at the same time with *The Story of Caves*. It was lying there with the other new books that the editor of *Nature Magazine* had left for my attention. Intrigued by the cave book for children, I suppose, I was in the right mood to be interested by Mr. Colby's book of pictures. If I read the code number correctly on the book jacket, "008-000," I assume this volume is for people from 8 years old up to a thousand, or at least on up as far as they get. I open it at page 40 and find a picture entitled "Mammoth Cave's Echo River" and I read this paragraph:

At Mammoth Cave

"Often a simple action will have surprising results. Many years ago a hunter in central Kentucky wounded a bear who crawled into a cave. The hunter followed him and as a result discovered Mammoth Cave, one of the greatest underground wonders of the world. According to experts, there are at least 100,000 miles of underground passages beneath Kentucky, with a majority of them unexplored or even undiscovered, with the exception of Mammoth and its famous Echo River. There are five separate levels to this system of caverns, and Echo River flows along at its lowest, more than 360 feet below daylight. It eventually empties into the Green River, which flows through this area on the surface. Boating on Echo River is a weird and even frightening experience. Voices echo and re-echo back and forth in an amazing chorus which is almost musical. And no one has really experienced darkness until all lights have been extinguished while drifting down this river. It is then that you understand why the fish who live in its water have no eyes, for there is absolutely nothing for them to see. The opposite page shows a formation known as the Theater Curtain in one of the cave's great rooms."

Thus Mr. Colby deals with the natural wonders that he has represented in 48 photographs, which he has obtained from the National Park Service and some State agencies. He does not demand attention very long on any one subject. His book is more pictures than words—much more. He emphasizes the wonder of the scenes he selects. So I suppose this is a children's book, but I am sure it would be a good book for adults wherever they seek something to ease the tedium of waiting, in doctor's offices, for example.

A picture book

There was a third book that attracted my attention that day—after I had decided to take *The Story of Caves* and that other children's book on *America's Natural Wonders*. It was a big book—a foot tall and nine inches wide—and was nearly all pictures, enlarged pictures, only one on a page. So I took it, too, and read it with deep pleasure, I might say

profound enjoyment.

Oh, but no children's book, it was. Rather it is, a highly sophisticated elaboration of wonder. I might have known this from the book's title, *Forms and Patterns in Nature*, and the preface soon makes this plain. With 62 of his own photographs (enlarged from Leica negatives) and 26 other photographs that he has obtained from others to fulfill his purposes, Wolf Strache has documented his perception, or discoveries, that "Nature uses the same ideas in her forms and patterns in quite different places" and "human imagination, too, so it would seem, draws on the same store of patterns that Nature uses for her purposes."

A river estuary

"The aerial photograph of a river estuary," writes Mr. Strache in his preface, "resembles a plant with its stem, its leaves, and its flowers, and the forked lightning striking from the sky displays a similar branching pattern. The foot of the mushroom coral has the same arrangement of lamellae as the underside of a mushroom. Both butterflies and birds are adorned with gleaming peacock's eyes. The bone tissue of a sheep looks similar to the fur of the jaguar."

"It is one of the special pleasures of the naturalist and the photographer," says Mr. Strache, "to discover these parallels in different realms of creation. And this book," he continues, "which purposely limits itself to black-and-white reproductions, may assist in tracking down these secret designs of Nature."

So Wolfe Strache's picture book, for its sophistication, its abstraction, proves itself no children's book in any narrow sense. I read it—as I had planned—with C. B. Colby's collection of photographs of *America's Natural Wonders* and Dorothy Sterling's *The Story of Caves*, but it suggested what truly children's books are, by showing what they are not. An intriguingly interesting work, it is artistic, intellectual, complicated, because it has been concerned primarily with sophisticated comparison based on abstractions.

America's Natural Wonders: Strange Forests, Mysterious Caverns and Amazing Formations. By C. B. Colby. New York: Coward-McCann Inc. 1956. 48 pp. (7½ by 10¾ in.) with 48 photographs and 6 diagram drawings. $2.

Forms and Patterns in Nature. By Wolf Strache. New York: Pantheon Books Inc. 22 pp. plus 88 plates (9¼ by 12¼ in.) $7.50.

The Story of Caves. By Dorothy Sterling. New York: Doubleday & Co. Inc. 1956. 121 pp. (6¼ by 9½ in.) with about 100 drawings or woodblock prints by Winifred Lubell reproduced with colors, list of "Caves to Visit," and index. $3.

Insects and their World

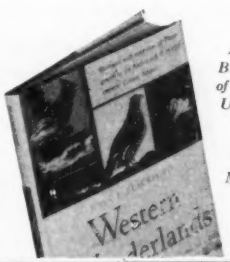
By Carroll Lane Fenton and Dorothy Constance Pallas. New York. 1956. John Day Company. 95 pages. Illustrated by Dr. Fenton. $2.95.

Insects constitute the largest group of all the living creatures on earth. And in their variety of form and habitat they are infinitely fascinating. In this book the authors provide an introduction to the insects, treating them as living things and not as specimens in a museum. From our observation young people do not have to be inspired to an interest in insects, but this book should be able to direct that interest as well as abet it.

Just Published!

WESTERN WONDERLANDS

by John L. Blackford



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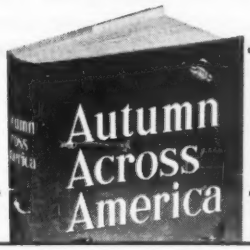

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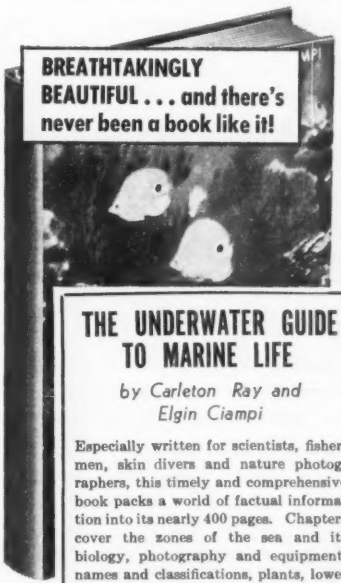

THE UNDERWATER GUIDE TO MARINE LIFE

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Briefly Noted

Wilderness Camping and How to Enjoy It. By Keith Wilton Barnes. New York. 1956. Vantage Press. 51 pages. $2.00. Helpful information on living in the wilderness and what to look for and see there.

Introduction to Ornithological Nomenclature. By Mary Ferguson Coble. Los Angeles. 1956. American Book Institute. 95 pages. $1.50. Revised edition of this excellent publication, which achieves its objectives of making ornithological nomenclature more intellible to the bird enthusiasts not versed in the classical languages.

The Web of Life. By John H. Storer. New York. 1956. The New American Library. 128 pages. A Signet Key Book edition of this "First Book of Ecology."

Geology and Ourselves. By F. H. Edmunds. New York. 1956. Philosophical Library. 256 pages. Illustrated. $10.00. A British geologist writes of geology and its importance to humans.

Fields of Force. By Winifred Duncan. London. 1956. Theosophical Publishing House. 67 pages. A excursion into Hindu metaphysics as applied to biology.

The Heritage of Community. Yellow Springs, Ohio. 1956. Community Service, Inc. 64 pages. $1.00. A critique of community living based on great ways of life practiced by small communities over the world.

Guide to Photographing Animals. By Sam Dunton. New York 1956. Greenberg. 128 pages. Illustrated. $1.95. Practical advice to animal photographers by the staff photographer of the New York Zoological Society.

Magic Bullets. By Louis Sutherland. Boston. 1956. Little, Brown and Company. 148 pages. Illustrated by E. Harper Johnson. $3.00. The story of man's struggle against enemy microbes.

Mr. Hare. By Gardell Dano Christensen. New York. 1956. Henry Holt and Company. 64 pages. Illustrated by the author. $2.25. Story for young people about the hare and its companions in the wild.

Pelican Prill. By Gloria Forsyth. New York. 1956. E. P. Dutton and Co. Illustrated by Robert Henneberger. 128 pages. $2.50. A story of a pet pelican orphaned on the Florida keys and adopted.

Bird-Ringing. By R. M. Lockley. New York. 1956. John de Graff, Inc. 119 pages. $2.50. The author, British ornithologist, has banded more than 20,000 birds and knows whereof he writes.

Dictionary of Poisons. By Ibert and Eleanor Mellan. New York. 1956. Philosophical Library. 150 pages. $4.75. Poisons of all kinds, including those of natural origin.

American Moths of the Subfamily Phycitinae. By Carl Heinrich. Washington, D.C. 1956. Smithsonian Institution. 581 pages. Illustrated. U.S. Government Printing Office. $5.50. Scientific description of this subfamily.

Mission on the Nile. By J. Dempsey. New York. 1956. Philosophical Library. 247 pages. Illustrated. $6.00. Missionary life among the Shilluk people of the Upper Sudan.

The Good Knight Ghost. By Jeanne Bendick. New York. 1956. Franklin Watts, Inc. 51 pages. Illustrated. $2.50. Entertaining story of adventure in a museum.

The Origins and Prehistory of Language. By. G. Revesz. New York. 1956. Philosophical Library. 240 pages. $7.50. Theory that should provide food for thought among the philologists.

Animals All. Selected by Peter Skelton. New York. 1956. John Day Company. 253 pages. $3.75. A collection of animal stories in which the animals themselves are the heroes.

Science and Economic Development. By Richard L. Meier. The Technology Press, Massachusetts Institute of Technology, and John Wiley and Sons. New York. 1956. 266 pages. $6.00. An imaginative work that traces out new paths for economic development suggested and shaped by recent advances in science and technology.

After the Sun Goes Down. By Glenn O. Blough. New York. 1956. Whittlesey House. 48 pages. Illustrated by Jeanne Bendick. $2.50. Story for youngsters about animals at night.

The Technique of Bird Photography. By John Warham. New York and London. The Focal Press. 199 pages. Illustrated. $4.95. An eminent and successful British photographer of birds presents a practical book of advice that will be useful to photographers everywhere.

Bird and Butterfly Mysteries. By Bernard Acworth. New York. 1956. Philosophical Library. 303 pages. Illustrated. $7.50. A discussion of the migration of both birds and butterflies as observed and recorded in Europe.

Compost for Garden Plot or Thousand-Acre Farm. By F. H. Billington and Ben Easey. Boston. 1956. Charles T. Branford Co. 104 pages. $2.00. Revised edition of this practical little book on a subject important in organic gardening.

Whistle Punk. By Bill and Rosalie Brown. New York. 1956. Coward-McCann, Inc. Illustrated by Richard Bennett. $2.25. A child's story of logging.

Skin Diver. By Zachary Ball. New York. 1956. Holiday House. 251 pages. $2.75. Joe Panther, a young Seminole skipper of a deepsea fishing boat, is the central figure of this story of the underwater world.

Siamese Cat Book. By Vera M. Nelson. Fond du Lac, Wisconsin. 1956. All-Pets Books, Inc. 136 pages. Illustrated $2.50. All about this interesting breed of felines.

Dead Towns and Living Men. By Sir Leonard Wooley. New York. 1956. Philosophical Library. 220 pages. Illustrated. $6.00. Recollections of an eminent British archeologist.

Three Seeds. By Hester Hawkes. New York. 1956. Coward-McCann, Inc. Illustrated by Kurt Wiese. $2.25. Three American seeds and how they grew in Philippine soil.

The Book of Reptiles and Amphibians. By Michael H. Bevans. New York. 1956. Garden City Books. 62 pages. Illustrated in color by the author. $2.50. A colorful and popular introduction to the more common reptiles and amphibians. A large-size book for home use.

The Earth Beneath Us. By H. H. Swinnerton. Boston. 1956. Little, Brown and Company. 335 pages. $5.00. Popular introduction to the age and origin of the earth, the formation of rocks and ores, the evolution of plants and animals, the coming of man and the first stirrings of civilization.

Volcano Adventure. By Willard Price New York. 1956. The John Day Company. 187 pages. $3.00. Fictional treatment of the subject of gathering material about Pacific volcanoes.

Contents noted BY THE EDITOR

"A SHODDY ARGUMENT" IS THE DESCRIPTION that the *Boston Herald* gives to the recent advertisement of Rayonier, Inc., which seeks to break down the protection of Olympic National Park on the plea that newsprint is short because it is locked up in the Park area. The shoddiness of the argument, the editorial says, lies in "the premise that there are no important values except commercial values." Pointing out that "a wilderness area can no longer be a wilderness area if it is invaded by the lumber industry," the newspaper adds: "The point of a wilderness area is to preserve life and land the way it was before civilization hit it. The reasons for doing this are simple; there is something inspiring to all of us in seeing nature growing—and, yes, decaying—in the way it has for a million years, without the man with the saw keeping things neat. The reason is becoming more valid all the time as our population grows, and our cities and highways and suburbs expand." The editorial also stresses the importance of such an area scientifically, and concludes with a sentence that is most significant in view of its source: "We'd rather have the park than the paper from it."

IRRIGATION CANALS SERVE WILDLIFE as a vital source of water in many parts of the West. Both birds and mammals seek out this water, often to their doom, since hunters lie in wait along the banks of these canals, reports Dr. H. M. Weber of the California Committee for Dove Protection. There is great resultant slaughter of mourning doves, not two out of one hundred birds escaping the barrage. Many birds, Dr. Weber points out, are lost in the water, or fall wounded in the underbrush and are not recovered. One out of every five birds killed, he asserts, will have young in the nest, these left, of course, to starve in the name of "sport." In the light of this situation, Dr. Weber proposes that the California Fish and Game Code, now being revised, should add to its prohibition of shooting within one-eighth of a mile of artificial watering places, or "guzzlers," prohibition of shooting within one-eighth of a mile of the right-of-way of any irrigation canal. In the name of both humanity and sportsmanship this is certainly a reasonable proposal.

TRUMPETER SWANS AND MUSKOXEN have one thing in common—both were reduced to the brink of extinction by man. The United States' population of the swans was thought to have been wiped out by the turn of the century, but a few birds found in the Red Rock Lakes area of Montana formed the basis of a flock that, through protection, has been built back to nearly 600 birds. The annual aerial survey of the trumpeter this year showed 588 birds as compared with 590 last year. The muskoxen had been wiped out in Alaska a century ago, but some twenty years ago a herd of the animals was brought from Greenland. In 1935 and 1936 thirty-one animals were placed on the National Wildlife Refuge on Nunivak Island in the Bering Sea. Enjoying a wide, bleak and generally cold habitat, the animals have now increased to 126. There were twenty-six calves in 1956, the largest number of youngsters to date.

PLACING A PRICE TAG ON OUR WILDLIFE in terms of the amount of money spent to kill the game species has always seemed to us definitely questionable. When it was announced by the Fish and Wildlife Service that $134,000 was to be spent to hire a survey organization to determine such a price tag, we pointed out editorially that such a survey ignored the interest of those who like their wildlife alive. The survey was undertaken with funds derived from the Federal excise tax on sporting arms and ammunition and on fishing equipment. The report says that 20,000 homes were contacted and 6220 anglers and 3018 hunters interviewed. Whether the balance of some 10,000 homes turned up non-hunters and non-fishermen, and so were of no interest, is not revealed precisely, although one household in three is said to have provided at least one hunter or angler, or both. One out of every five Americans over 12 years was discovered to be either nimrod or devotee of the rod and reel. In the price tag area, it was found that 25,000,000 anglers and hunters spent nearly three billion dollars for 500 million days of sport. They drove automobiles more than ten billion miles in the process, and spent an average of $114.42 apiece in pursuit of these forms of recreation in 1955. The complete survey, which in our opinion is still one-sided and therefore biased on the side of the economic importance of sport hunting and fishing, is published as Fish and Wildlife Circular 44. You can get it from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., for forty cents in coin of the realm.

NATIONAL PARENT-TEACHER, OFFICIAL MAGAZINE of the National Congress of Parents and Teachers, observed its fiftieth anniversary in November, 1956. Not many periodicals reach this golden anniversary distinction, and few can look back over five decades of such signal service to the community and to the American people. We salute our fellow editors on this record of accomplishment. R.W.W.

The Carolina Low Country is a strangely beautiful region of tidal rivers, eerie swamps and marshes, and silent forest festooned with moss. Here is a scene on the Brookgreen sanctuary.

A 10,000-acre sanctuary preserves

The Beauty that Is Brookgreen's

By ALBERT H. HINDMAN

Photographs by the Author

In wet weather this will be a natural pond and haven to many ibises, herons, ducks and geese that will find protection here.

THE LITTLE wooden row boat, with its low-powered outboard motor, putt-putted along cypress-shadowed Springfield Creek. As it rounded a bend, several wood ducks arose and flew swiftly away, sounding their odd whistling cry, so different from the "quack" of other species. Down stream, a great blue heron flapped lazily along beneath the long festoons of Spanish moss that hung from the trees.

This was the Carolina Low Country, a weird, strangely beautiful region of tidal rivers, of eerie swamps and marshes, and silent, shadowed forests of cypress, pine and tupelo. This was, too, the 10,000-acre domain of the Brookgreen Gardens Wildlife Sanctuary, which lies

seventeen miles north of Georgetown, South Carolina, and between the Waccamaw River and the sea.

In January, 1930, two persons visited this region and fell under its magic spell. They were the late Archer M. Huntington, noted scholar and philanthropist, and his wife, the former Anna Hyatt, internationally famous sculptress. Their imaginations were inspired by the area and by its possibilities. Their first thought of it was as a winter home, and it was for that purpose that, in 1930, they purchased Brookgreen and three adjoining plantations, all renowned in the annals of the South,—The Oaks, Springfield, and Laurel Hill.

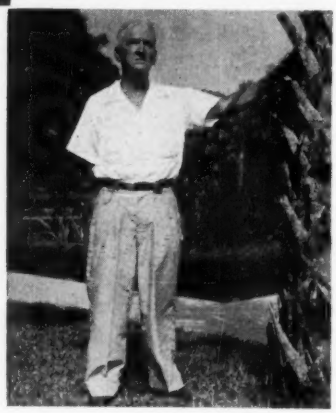
Brookgreen's first settlers were the Allstons, who came there in the 1720's. The fine old plantation house that they built stood for nearly two centuries, until it burned in 1901. Mrs. Louis Hasell, who owned Brookgreen at that time, built another house on the same site, which was later used by hunting clubs that subsequently owned the property. This house was in such bad condition when the Huntingtons bought Brookgreen that they had it removed in 1931, and, on a strip of sand beach along the seashore, the Huntingtons built a large Spanish-type brick house, with enclosed palmetto-lined courtyard. They named it "Atalaya," after the towers that watch the sea along the coast of Spain. Both house and name reflected the fact that Mr. Huntington was a noted Spanish scholar, and founder of the Hispanic Society in America.

In the heart of Brookgreen plantation, on the old Allston homesite, were remnants of a boxwood garden, and a beautiful avenue of massive live oak trees, festooned with long streamers of Spanish moss. Using these oaks as a natural axis, the Huntingtons laid out forty-four acres of formal gardens, at first intended to provide a setting for Mrs. Huntington's sculpture. This original plan was gradually extended to embrace the works of

A buck in the sanctuary pauses in an open spot to provide opportunity for a camera shot.

The oak walk in the Brookgreen Gardens provides a setting for the sculpture of "Boy and Squirrel" by Walker Hancock.

The palmettos for the palmetto grove at Brookgreen were brought from below Charleston by Frank Tarbox, Jr., director of the area and its curator of flora.



Mr. Tarbox stands beside one of the palmettos in the grove.

other American sculptors whose work is representative of American art. Today Brookgreen Gardens contain more than three hundred figures and groups in bronze, marble and stone. The collection as a whole reviews the course of American sculpture from the middle of the nineteenth century to the present. To be represented at Brookgreen is regarded as a high honor. Outdoor and Nature subjects predominate, and this is the largest collection of American sculpture in one spot in the world.

There is no admission charge to Brookgreen Gardens, and they are open the year around, except Mondays and Christmas, from 9 a.m. to 5:30 p.m.

The formal gardens are enclosed with winding, open-work brick walls, which outline the grounds without completely shutting them off from the surrounding countryside. These serpentine walls form a series of shallow curves, and they are softened with trailing vines, providing ideal niches and backgrounds for sculpture. The red brick was sprayed with cement, giving it a gray tone to harmonize with the Spanish moss hanging from the live oaks.

In 1942, these garden walls were decorated at intervals with stone plaques, engraved with "the verse of some of those writers who have taken pleasure in the beauty of nature and her living forms," to quote Mr. Huntington's own words. Joyce Kilmer's "Trees," Shelley's "The Cloud," Archer Huntington's "The Eagle," Archibald Rutledge's "The Meeting," Bryant's "Thanatopsis," and others are there. In November, 1955, Mr. and Mrs. Huntington asked my permission to place in Brookgreen my verse, "Side Roads I Love," which appeared in *Nature Magazine* in October, 1955.

The garden walks were designed by Mrs. Huntington to take the shape of a butterfly with outspread wings. These pathways pass ornamental pools, surmounted with sculpture, all the walks winding around the central space that was the original house site. The walk through the avenue of massive live oaks is particularly impressive and beautiful. Many of the large groups of

This freshwater marsh is located inside the dam that was built so that this area could provide a feeding and resting place for waterfowl.

A flock of wild turkeys is maintained in the area of the gardens set aside for the display of birds and mammals native to this area.

statuary in the gardens were carved in stone and marble by Robert A. Baillie, now Curator of Sculpture. He was with Gutzon Borglum for ten years.

In addition to the interest provided by Nature subjects in stone, bronze and marble, outdoor people will delight in the flora of the Gardens. Camellias, magnolias and hollies abound, and Frank G. Tarbox, Jr., Director of Brookgreen and Curator of Flora, has transplanted to the formal gardens from the neighboring forests and marshes more than six hundred species of native plants. Mr. Tarbox, a widely recognized botanist, has discovered three new varieties of the dahoon holly.

When the original Allston plantation house burned in 1901, the old kitchen, standing about fifty feet away, was not damaged. It has been moved and placed in the south part of the garden. Its huge old fireplace, and its utensils of two centuries ago, tell visitors of an earlier day. Opposite the old kitchen, at the other side of the Gardens, is the Museum of Small Sculpture, built in 1932, and enlarged in 1937.

In order that the more than 350,000 visitors to Brookgreen each year may see, in addition to its flora and sculpture, representative mammals and birds of the region, a zoological collection has been established near the entrance to the Gardens. The enclosures give much more freedom to the animals than do most zoos. Large runs make deer and wild turkeys feel at home, and, in addition, there are bears, panthers, raccoons, otters, opossums, squirrels and foxes. A pond of about ten acres has been built here for waterfowl. Wild ducks and geese from the outer Sanctuary come to feed with the tame ducks in the pond, and now more than two hundred Canada geese visit this spot each year. Grain is planted for them in a nearby field. Many ducks are caught and banded—as many as 1600 in two months—to aid in the study of flights of migratory birds.

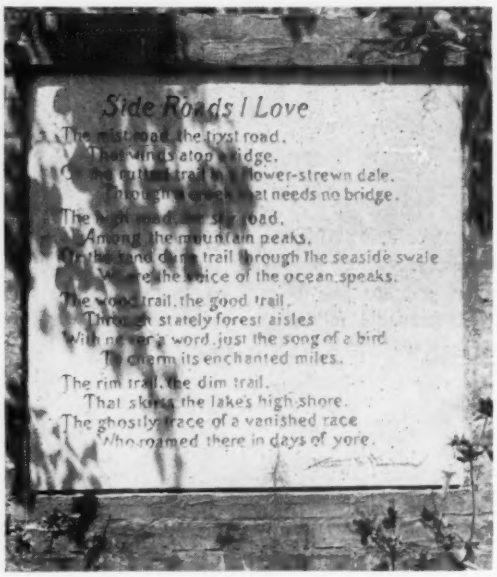
After the formal Gardens were well under way, the

Gurdon Tarbox is the forester and warden of the sanctuary, looking out for the well-being of the wildlife and alert for poachers on the area.

The wide and deep Waccamaw River, as seen from Laurel Hill, now a part of the Brookgreen Estate. →

Huntingtons decided to make the entire domain a sanctuary "for the preservation of the flora and fauna of the Southeast." In 1932, Brookgreen was incorporated and placed in the hands of a self-perpetuating Board of Trustees to manage it for the people of South Carolina, and this property of approximately 10,000 acres was transferred to the State. In 1935, Mr. Huntington provided an endowment fund of one million dollars for its maintenance.

The present staff of Brookgreen consists of Frank G. Tarbox, Jr., Director and Curator of Flora; Robert A. Baillie, Curator of Sculpture; Gurdon Tarbox, (nephew of Frank Tarbox) Forester and Warden of the Wildlife Sanctuary; Robert C. Macfarlan, in charge of animals; Mrs. W. G. Chandler, in charge of the Museum of Small Sculpture; Miss Ellen Irwin, district nurse for the white and colored personnel who serve under the administrative staff.


Side Roads I Love
The wood trail, the good trail,
Among the mountain peaks,
The rim trail, the dim trail,
That skirts the lake's high shore.

The author's poem, which appeared in *Nature Magazine* in October, 1955, is engraved on a wall in Brookgreen Gardens.

Interesting as are the formal gardens and zoo, they are small in size compared to the reaches of the surrounding wildlife sanctuary. The legislature of South Carolina, in its 1942-1943 session, made a wildlife sanctuary of the lands of Brookgreen, with hunting, fishing and other trespass prohibited at all times of the year. Only the gardens and zoological station are opened to the public. But, although the public is not admitted to the surrounding Sanctuary, this area provides haven for thousands of migratory waterfowl, and for many other animals.

From its three miles of ocean frontage Brookgreen's marshes and forests stretch back into the interior, to the wide Waccamaw River. Gurdon Tarbox constantly explores the shadowy fastnesses of longleaf pine, oak and cypress, and pushes his little boat up winding tidal rivers and their tributaries, ever in search of trespassing poachers.

In August, 1956, Gurdon took me with him into the wildness that is Brookgreen's. The start was made at the sea. The blue waves of the Atlantic roll ceaselessly upon Brookgreen's three miles of ocean front. Fifty feet or so from the farthest reach of the tides, sand dunes rise to a height of four or five feet. These are covered with a sparse growth of sea oats. Hurricane Hazel, in October, 1954, swept huge waves over these dunes, completely flattening them, but they have now been restored by the winds. These dunes extend some three hundred yards to a salt marsh, which separates the mainland from the beach. One end of this marsh is open to the ocean, and across this marsh Mr. Huntington built a dam. On the inland side of the dam, the salt water was diluted out, and now there is a large fresh-water lake there with a stationary water level, an ideal haven for waterfowl. The saltwater marsh on the ocean side of the dam still rises and falls with the three-foot tides.

In the forests, further inland, there are open places of several acres here and there—low, marshy depressions where no trees grow. In wet weather, these are completely filled with water and provide additional havens and feeding spots for waterfowl. The wood ducks were plentiful around these areas. On the trees, about fifteen feet from the ground, nesting boxes are placed for the wood ducks. Other boxes are also placed on trees along the banks of the rivers and creeks that flow through the Sanctuary.

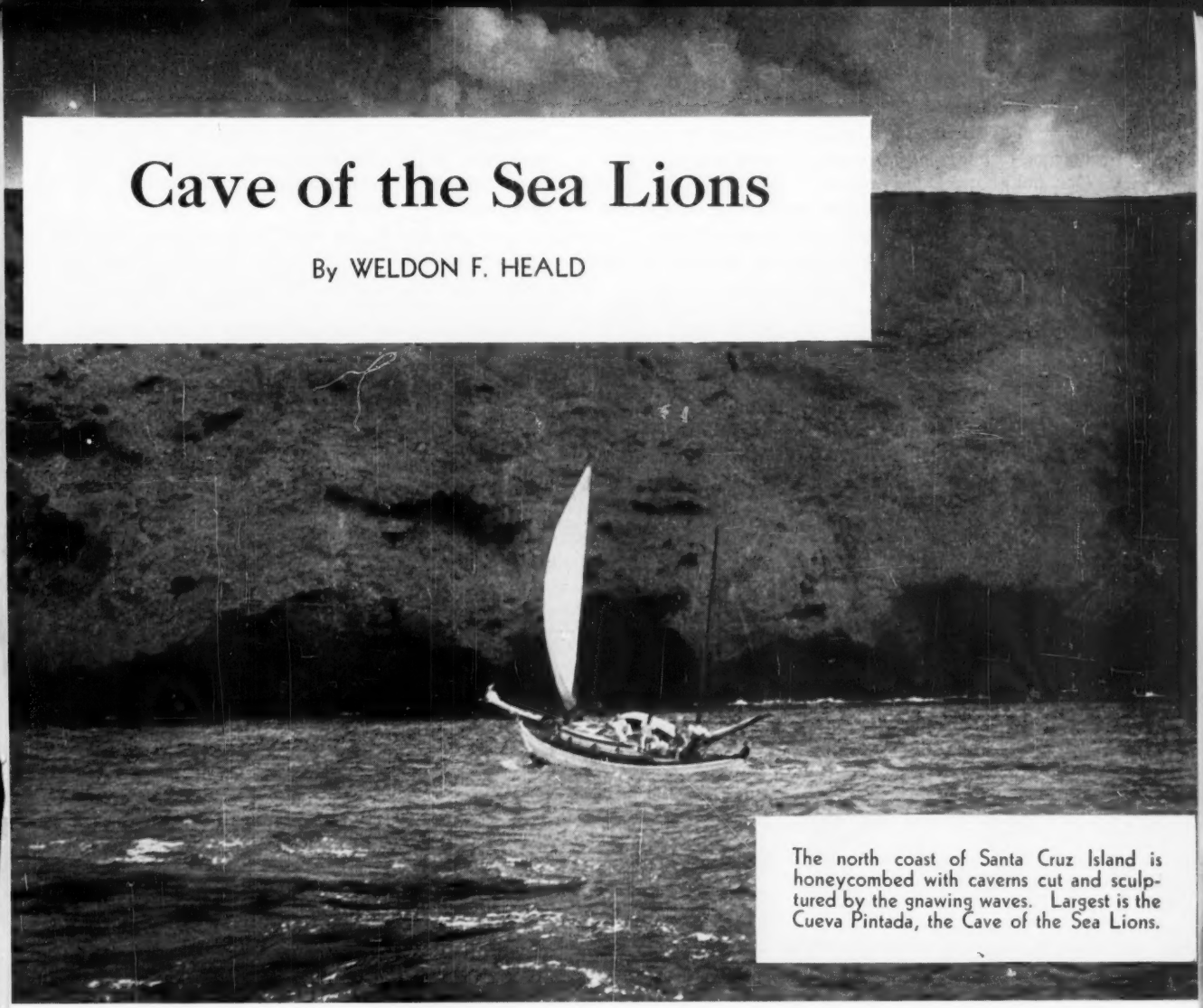
Springfield Creek, one of these streams, was explored in our small boat. A small tributary, about fifteen feet wide, came into sight along the left bank of the stream, and into this Gurdon steered our boat, and proceeded down its narrow course for a half-mile or so. He explained that the tributary was an old irrigation ditch, and that the field through which it ran was a former rice field, of more than a thousand acres. It had been abandoned shortly after the War between the States and left to grow up to marsh grass. Now it is one of the chief havens in the Sanctuary for thousands of wintering geese and ducks. Wood ibis by the hundreds also visit this and adjoining marshes each fall, and remain, as do also some white egrets, but most of the egrets and herons go further south for the winter.

On succeeding days, the boat was abandoned, and we traveled through the forest by jeep, and along its narrow, shadowy trails on foot. The term "sanctuary" gained new meaning as a buck deer, awakened from its morning nap, sprang from its bed in a thicket and dashed away through the trees. Pileated woodpeckers were numerous and large fox squirrels plentiful. Far above the tree tops a bald eagle soared among the clouds. There are several pairs at Brookgreen, nesting early, right after Christmas.

On one expedition through the woods, Gurdon, who received his Master's Degree in Forestry from Purdue University, pointed to a queer looking tree about seven inches in diameter. It had spiny protuberances on its bark, and is called Herculesclub, or toothache tree. He said that the Indians used its bark (*continued on page 547*)

Cave of the Sea Lions

By WELDON F. HEALD



The north coast of Santa Cruz Island is honeycombed with caverns cut and sculptured by the gnawing waves. Largest is the Cueva Pintada, the Cave of the Sea Lions.

The *Seyelyn* cruised eastward at half speed along the north shore of Santa Cruz Island. Everything was gray. Grim gray cliffs rose sheer from a choppy, slate-gray sea and disappeared into an opaque curtain of gray fog above. Even the restless foam that fringed the cliffs and flecked the waves was gray. So, too, were the wheeling gulls and occasional flying fishes that skimmed the surface of the water. The only bright thing was the 104-foot, diesel-powered yacht. But the *Seyelyn* in her trim whiteness seemed a frivolous intruder in a desolate gray world.

With the moist salt wind in our faces, we leaned against the starboard rail and peered ahead at the murky line of cliffs. We were looking for the *Cueva Pintada* of the Spaniards—the Painted Cave—reputed to be one of the world's largest marine grottoes and the home of hundreds of sea lions.

Santa Cruz, largest of southern California's Channel Islands, lies off the coast about twenty miles south of Santa Barbara. Twenty-two miles long and averaging five miles wide, it is rugged and mountainous, and the rocky shores are noted for their sea caves. In fact, the entire north coast along the water line is honeycombed with caverns cut and sculptured by the gnawing waves. Some are mere slits and blowholes, others so low they cannot be entered, and a few have underwater entrances. But by far the most remarkable is the *Cueva Pintada*.

Undoubtedly seen by the distinguished navigator, Juan Rodriguez Cabrillo, who sailed these waters in 1542, this amazing cave is still little known and seldom visited. The reason is that Santa Cruz is privately owned and for three-quarters of a century strangers have not been particularly welcome. We had been lucky however, in wangling an invitation of sorts. That is, we had gotten permission to explore the coast, but were not encouraged to penetrate inland at any point. So we had spent several days cruising around the island, poking into bays and hidden coves.

The *Seyelyn* continued to cut slowly through the gray water. Suddenly the Skipper shouted from the pilot house.

"There she is!"

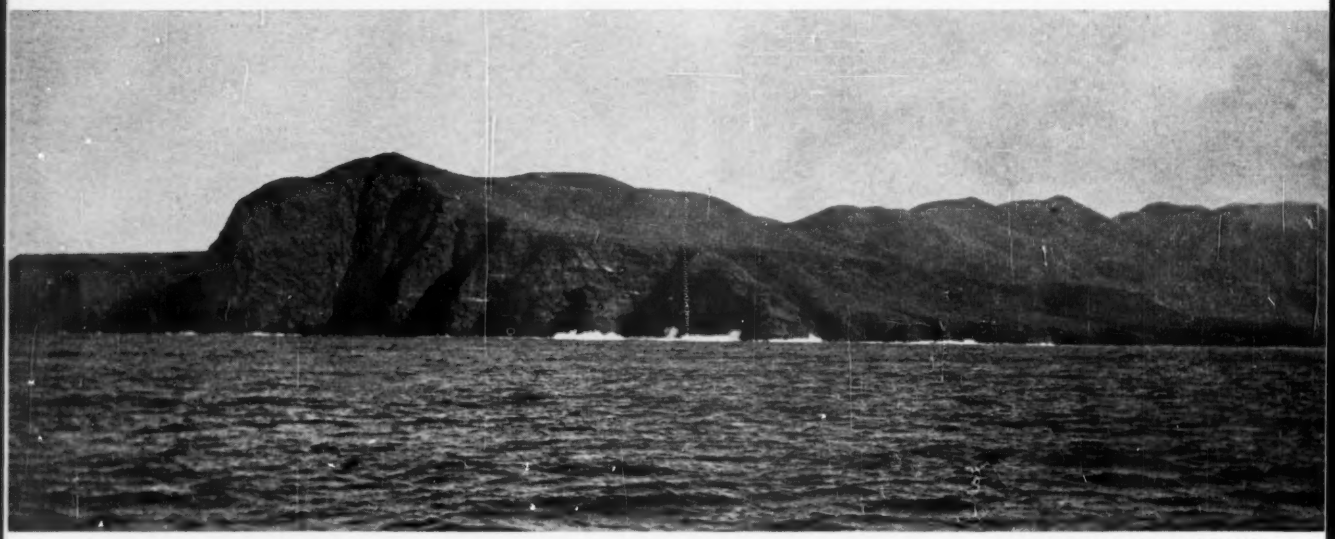
Then we saw through the dimness a great black gash in the cliffs ahead. It seemed to split them from top to bottom, as if a giant had swung a sword in a fit of rage. Our pulses quickened a little. We knew that this somber portal led into the dark heart of the earth where there were secrets perhaps no man should know. The gaping black hole in the surrounding grayness looked forbidding, inhospitable and treacherous.

In a few minutes the *Seyelyn* came to rest in the little harbor beside Point Diablo. The anchor chain rattled down and we swung to, with the high arched entrance of the cave before us. All hands immediately got busy. The dory was lowered to the water from the top deck, and made ready. Four, however, agreed with the engineer that the delights of albacore fishing exceeded those of pushing into dank, dark holes, and they remained on board. So the six of us who felt the explorer's urge shoved off in the dory, with the Mate at the oars.

The approach from the water was extremely impressive. The cave entrance rose to a pointed Gothic arch, sixty to seventy feet high, flanked by two massive buttresses. These slanted down the cliffs and formed at the waterline a semi-circular marine forecourt. As we rowed into it the waves lazily sucked and gurgled among the rocks, kelp fronds slowly swayed beneath us, and wisps of fog streamed down the cliffs, alternately hiding, then revealing the huge yawning orifice ahead. A clammy gray gloom enveloped everything.

It was an eerie place, uncanny and sinister, and the sense that it was not real increased as we passed through the great portal and entered the cave. Here the light dimmed to a ghostly gray dusk, and imprisoned sounds echoed hollowly as if trying to escape to the open air. When our eyes became accustomed to the deep twilight, we found we were in a vast vaulted chamber, perhaps eighty feet high. We saw, too, why Painted Cave is a fitting name. The limestone walls and ceiling have been dyed by the salts through the centuries into fantastic patterns of brilliant yellows, soft browns, reds, greens and vivid white.

At the far end of the chamber an ominous looking corridor led into black obscurity. We entered and followed it through increasing darkness until we came to an opening not much bigger than the boat. In fact, each successive wave, swelling and hissing up the narrowing corridor, almost closed the hole. As we approached, an unearthly cacaphony of muffled distant barks, honks and yelps came from the depths of the cave beyond. Then, suddenly we were startled to see two gleaming, silvery apparitions emerge from the hole, one after the other, and swiftly sweep by under water, leaving a shimmering trail of phosphorescence behind them. These were sea lions coming out of the den we were about to enter.



U. S. DEPT. OF INTERIOR PHOTOGRAPH

Santa Cruz Island is rugged and mountainous, twenty-two miles long and rising to heights of 2500 feet.

Getting the boat as near the entrance as we could, we waited for the next wave. When it swished by and filled the hole, we pushed in immediately afterward, during the following subsidence. Ducking low, we just squeezed through before the next wave came along. At once we were in a completely black void, filled with an appalling confusion of weird reverberating sounds. The barking of the sea lions had stopped, but the wave ahead of us grunted, sobbed, and groaned as it surged into interstices and devious unfathomed caverns far back in the mountain. We could also sense the movement of living beings somewhere near, and were aware of a sibilant murmuring of sighs, wheezes and snorts.

The skipper lighted a flare and threw it on the water. Immediately another great chamber appeared around us, its dimensions so large that the ceiling and far recesses

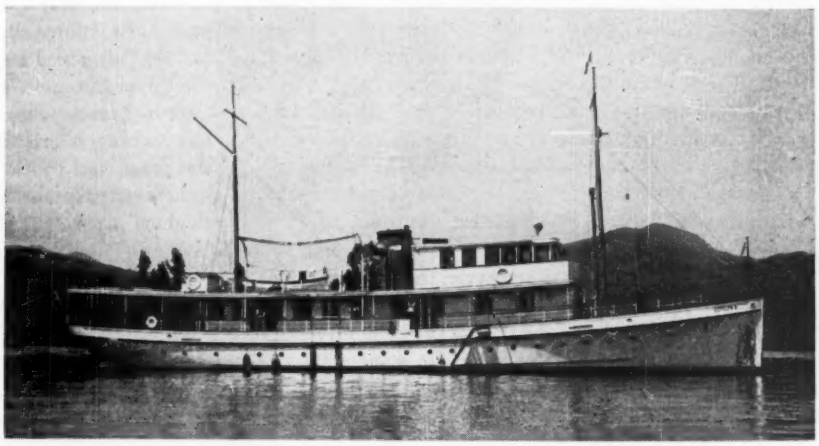
were hidden in vague shadows. But in the obscure darkness at the north end was a sight to make the heart skip a beat. There shone myriad glowing points of light, resembling the dying coals of a giant conflagration. As we rowed slowly and quietly in that direction we saw that these were hundreds of eyes watching us. A wide ledge sloping down to the water was completely covered with black, squirming masses of sea lions, alerted by our invasion of their den. As we neared the formidable array of aroused animals we assured each other that sea lions were usually gentle and good natured. We put out of mind those bloody battles of the males during breeding season, when the piercing screams of the warriors drift out over the ocean as eyes are ripped out, flesh gashed, and lips torn to shreds.

For the male sea lion is polygamous, and here the animals were huddled on the ledge in close-packed family groups. In the center of each was the huge male, eyes blazing, mouth open in a rasping snarl, and head waving from side to side. Around them were their harems of from five to a dozen females, each one sheltering her single pup, born earlier in the summer. Adult male sea lions measure eight to ten feet long, from nose to tip of short, stubby tail, and weigh up to a thousand pounds. But the females are much smaller, seldom reaching more than six feet. However, in the dim, spectral light of their den, deep in the earth, they looked like prodigious monsters of another world.

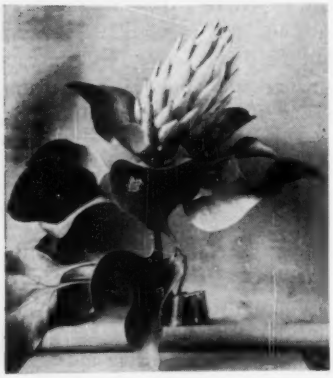
California sea lions are members of the seal family, as agile in the water as are their cousins, the fur seals, and much more so on land. Sea lions differ from seals, however, in having external ears, much longer necks, clawless front flippers without hair, and a coat of short, coarse, brown fur, worthless commercially, which turns a sleek, shiny black when wet. To maintain their active double life on land and sea they eat about forty pounds of marine animals a day, including some fishes, but mostly squids, octopuses and smaller floating organisms. They also swallow quantities of pebbles and mollusk shells, which remain in the stomach, apparently as aids to digestion. Sea lions are quick and intelligent and their spirit of play is strongly developed. Pups, particularly, like to frolic and gambol, shaking seaweed, tossing pebbles, and sliding down wet rocks. In captivity, adults show a remarkable aptitude for learning tricks, and it is usually sea lions that are billed in zoos, circuses and on the stage, as "trained seals." But perhaps the strangest thing in the life history of these aquatic experts is that the pups are at first terrified of the water and have to be taught to swim.

On we came, closer and closer, wondering what the animals would do. Finally, a female near the edge dropped off into the water with a splash, followed by her pup, and both glided rapidly under us like black phantoms. Soon another dived off the ledge and passed beneath us, bound for the entrance, then another, and another. At first they came one by one, but as the exodus gained momentum, whole groups disintegrated and the ledge became alive with oncoming sea lions, rotating hind flippers in their peculiar galloping gait. The water was churned to phosphorescent foam by the scores of diving animals, and our boat danced, teetered and bobbed about like a cork. Any one of the big males could have upset us if he had charged, and even the waves might do so. But all we could do was to cling to the gunwhales to keep from being thrown out and distribute our weight to keep on as even a keel as possible. The din was appalling and increased to a deafening crescendo. Roars and bellows from the fleeing animals formed a diabolical counterpoint to the continuous splashing of their diving bodies—all magnified to thunderous proportions in the echoing confines of the great underground chamber.

Eventually the ledge cleared and only a few defiant males were left. Above them all on the highest point was an enormous battle-scarred veteran. With his huge bull neck in the air, he was a magnificent sight as he hurled his vocal challenges down upon us. One by one the others retreated and disappeared into the water, until only the gigantic sea lion was left, standing his ground majestic in his isolation. We felt that here was a true king, a member of Nature's nobility who would die rather than surrender the an- (*continued on page 550*)



Several days were spent taking the *Seyelyn* around Santa Cruz Island, poking into bays and hidden coves.



Bud of *Protea cynaroides*.
COURTESY N. Y. BOTANICAL GARDEN

South Africa's Splendid Flower

By ELSIE A. PARRY

"WHAT handsome flowers! What in the world are they?"

"They are proteas, madam." The clerk at the flower booth in one of Cape Town's large hotels surveyed me with disapproval. Her voice registered pity for my abysmal ignorance. "The protea is the national flower of the Union of South Africa."

My ignorance was properly rebuffed but I did not really care. My innocent question had given me an introduction to an exciting member of the world's flora. *Exciting* is the word for proteas. Only a person completely unresponsive to Nature's accomplishments could ignore a protea—*Protea grandiflora*, for instance—in full bloom. The plant has dash and style, the set of its leaves proudly erect, its flowers almost flamboyantly handsome. The floral good looks of the family show amazing versatility for there are some 960 species in fifty genera. Small wonder that they were given the name of that prophetic old man of the sea, Proteus, whose ability to change his shape without losing his essential identity, won him fame in the classical world.

Australia can lay claim to about six hundred members of the *Proteaceae*, some 260 flourish in Africa's Cape Colony, and the rest are widely but irregularly distributed in southern Asia, South America, Australasia, and other parts of Africa. Botanists believe that these hard-leaved plants are survivors of an old element in the world's flora, once more widely, perhaps even generally, distributed in northerly lands but submerged there by the evolution of newer types. They survive today in southern lands that have now for a long period been more or less isolated from the larger northern land masses.

In 1652, when Jan Van Riebeck and his settlers landed where Cape Town now stands, the Cape hinterland was bright with proteas in bloom. It still is—in the southwest districts at the beginning or middle of winter; in the eastern and northern parts during the spring and summer. No visitor to the area will soon forget the visual impact of a massed stand of the protea called "silver tree," *Leucodendron argenteum*, sparkling like molten metal in the sunlight. *Protea mellifera*, probably the most common and certainly the best known of the Cape proteas, first appeared as a colored illustration in a botanical publication in 1795. The seed from which this plant was grown in the Royal Botanic Gardens of Kew was collected at the Cape by Francis Husson in 1774. Interest in these attractive and characteristic African plants grew steadily with the years, and by the middle of the nineteenth century some thirty species were being grown under glass in England alone. Between 1797 and 1811 no fewer than

The full beauty of *Protea cynaroides* in bloom.
COURTESY OF SOUTH AFRICAN RAILWAYS

forty colored plates of proteas were published.

The Cape settlers, both Dutch and English, were proud of these plants, which helped to clothe their new land with beauty. Unconsciously, perhaps, they admired the proteas' sturdy and ingenious adaptations to life as they found it in the south of Africa. The settlers had some adapting to do, as well! Choice of the protea as the floral emblem on the State coat-of-arms and as the flower of the Union of South Africa is an affectionate tribute to a well-loved compatriot.

The baffling diversity of the species makes the *Proteaceae* a difficult subject for generalization. They turn up as tender shrubs, as small trees, or as acaulescent shrublets. The botanist will say that, for the most part, their leaves are alternate, coriaceous, and entire; the flower heads are surrounded by involucres of conspicuous, often brightly colored scales. The plants are bi-sexual with zygomorphic perianth segments toothed or awned; the ovary is covered with long hairs; the fruit is a thick-walled achene, generally bearded.

So much for the botanical details. Even if you know them, the chances are still excellent that you will be fooled by the next protea you encounter into believing it is something else! Of greater interest is the manner in which the proteas have responded to the challenge of climate. The great majority live in regions where there is annually a long dry season. In order to maintain a healthy vigor in the face of recurrent drought, the proteas have built up formidable and, be it said, highly successful defenses against undue transpiration. The simplest one is the erect or nearly erect "set" of their dark grayish-green leaves. In this position the sun catches them on the tip rather than on the more vulnerable flat surfaces, which, to make doubly sure, are protected by a thick, leathery cuticle. The silver leaves of *Leucadendron argenteum*, covered with fine, silky hairs, reflect the light rays, while the leaves of the common "sugar bush," *P. mellifera*, present their edges to the sun. In many proteas the pollen is freely exposed although not wind-fertilized, a peculiarity that botanists feel may perhaps be connected with life in a dry climate.

"Which of the proteas do you like best?" is a question almost as difficult to answer as the one that plagues the returning traveler—"Which place did you like best?" If you are attracted by bright pink flower heads that look like "glorified artichokes," then *P. cynaroides* will get your vote. Large bushes of *P. speciosa* are considered fully as effective as big, specimen rhododendrons, while *P. mellifera* presents a magnificent appearance, its blossoms not one great simple flower but composed of a number of florets within a common calyx formed of numerous leaves or scales placed one on the other. *P. cordiflora* is a beautiful dwarf species with heart-shaped leaves and bright red stalks, which was first discovered in the mountains of Hottentot's Holland. I suppose my own favorite is *P. grandiflora*, which we came upon growing wild near South Africa's Outeniqua Mountains, not far from the town of George. The flower is a huge yellow-white pompom, delicate yet spectacular, the sort of bloom one expects to find in a greenhouse or in the window of an expensive florist, not "wasting its sweetness on the desert air," so to speak.

A group of Proteas from Kirstenbosch, all of which were found in flower in the New York Botanical Garden in September.

Several of the proteas are cherished locally for their "honey," by humans as well as by the sunbirds. The heads of *P. cynaroides*, for instance, are full of nectar when the flowers first open. The Boers call them "honey-pots" and collect the sweet nectar. This they evaporate to syrup and a kind of sugar. The blooming of the "honey-pots" is a great occasion for picnics, not unlike the sugaring-parties in our maple sugar areas. Protea syrup is said to have some efficacy as a household remedy, possibly because of its abundance of tannin, whose primary purpose is to protect the flower from insect attack.

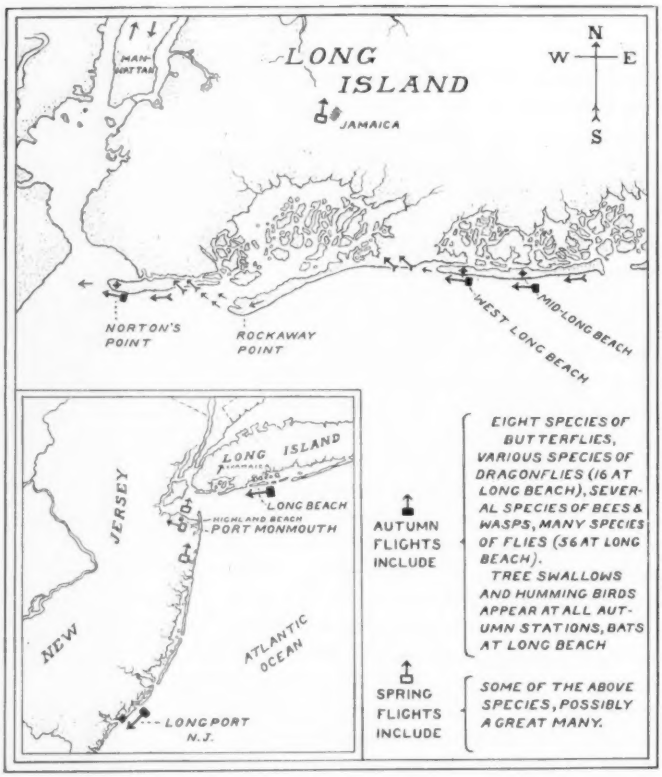
Flower growers in southern California are finding the cultivation of proteas rewarding and not too difficult. Given an airy, sunny coolhouse, well-managed drainage, and protection against excessive watering, these spectacular plants flourish and ripen their seeds freely. They are sturdy by nature and their remarkable flowers are long-lasting—welcome immigrants to these shores!

There is a challenge to observers of

Winged Hosts that Migrate Unseen

By HOWARD J. SHANNON

Illustrations by the Author



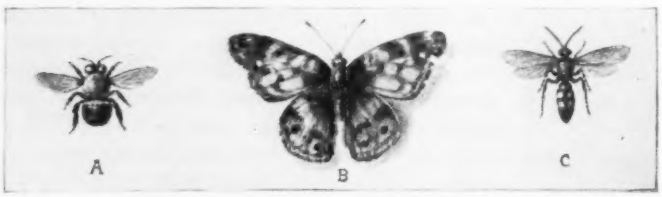
Observation stations for the autumn and spring migrations of many insects. Flights of remarkable impressiveness sometimes occur. Spring northward flights of flies, however, are not yet well defined.

STRANGELY enough, it was the autumnal processions of monarch butterflies flying westward along our Long Island beaches that first aroused my interest in what eventually became a new branch of science. Until 1915, the monarch, with a few vague exceptions, was believed to be the only butterfly that flew south in autumn and north in spring, thus presenting a spectacle comparable to that of the seasonal migrations of birds. But intensive observations hereabouts led to far different and even startling presumptions. Not only did other butterflies, traveling *singly*, wing their way westward and subsequently southward along our coasts, *other quite different insects, too*, participated in these remarkable seasonal migrations.

Many of these surmises of forty years ago have now become established facts. But there is still much to be learned. For so obscurely does this autumnal progression take place that only the most persistent observations pursued from hour to hour, from day to day and from week to week throughout the appropriate seasons can discover these slowly multiplying hosts that move almost unseen along our coasts. In fact, some species, like the minute kelp fly, *do* melt away so elusively that even actual clouds of them seem sometimes to vanish into thin air.

Thus it is not strange that, even in comparatively recent years, confused opinions have been held by the most eminent entomologists. One of them states that the monarchs that arrive north in spring are "always bright and gaudy." Yet all other students of this phenomenon, and my own considerable collection of these early butterflies, offer conclusive evidence that these early spring arrivals are *always* faded, and usually tattered and torn. Their appearance indicates, of course, that they are aged individuals that have spent the winter in Florida.

Then, too, quite recently, a well known naturalist revived the "drying up of ponds" theory to account for the migratory flights of dragonflies. Yet my local observations of such flights had already aroused the sus-



At the left are common migrant insects. First is (A) a bumblebee, *Xylocopa virginica*. (B) is Hunter's butterfly, *Vanessa virginiensis*. (C) is one of the wasps, *Campsomeris quadrimaculata*.

A semi-realistic concourse of autumn migrants on Long Beach. The butterflies, from right to left, are peacock butterfly, clouded sulphur, mourning cloak and violet tip. Other butterflies, such as Hunter's, the small white cabbage butterfly, the red admiral and monarch, disappear in the distance. Wasps and bees accompany the flight. Not all these insects are likely to appear at any one moment.

picion that they were true seasonal migrations that moved south in autumn and in the reverse direction in spring. This belief was subsequently confirmed by an intensive analysis of the *apparently* confused but *actually* orderly seasonal interchange between north and south shown by the more numerous flights reported from Europe. Nevertheless this "belated" drying up of ponds theory was revived in 1937, although the true nature of these flights had been well established in *Harper's Magazine* for September, 1915. Moreover, later observations made by others, and reported in various scientific publications, have won the complete acceptance of this belief in the seasonal migratory nature of certain dragonflies.

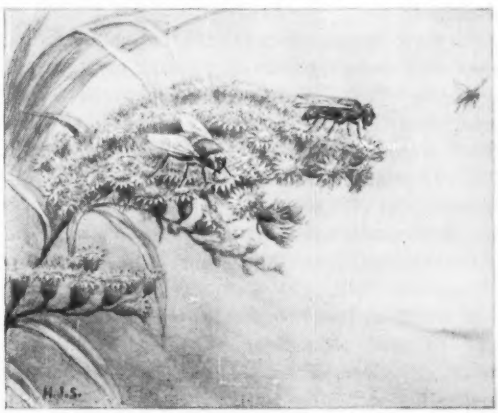
Bumblebees pause to feed on beach plum flowers in May before continuing their hurried flight north.

Quite recently a pontifical statement declared that *all* reputed insect migrations are merely wind-drifted swarms, thus persistent is the now totally discredited "wind-drift" theory.

Obviously to prove still further our early observations, a methodical approach was imperative. So various autumn stations were established along the Long Island coast, while another one, one hundred miles away, was chosen on the southern New Jersey coast at Longport. A spring station, frankly a weatherworn shack, was established on the northern New Jersey coast at Port Monmouth. Additional excursions were undertaken in other localities in the hope of uncovering further clues.

Revelations of strangely striking interest, of truly astonishing variety, and, in some cases, of impressively spectacular proportions were unfolded as these observations progressed. Insects never before considered migratory, even those flatly denied to be such by the most ex-

A migrant flower fly, *Eristalis tenax*, pausing in autumnal flight to feed on seashore goldenrod.



perienced entomologists, proved to be regular travelers. Their arrivals and departures were as predictable as those of the tree swallows, or the far more elusive hummingbirds they accompanied. And many of these insects rivalled these companioning birds in their urgent, life-preserving drive toward the west and south.

Most colorful, of course, were the migrant butterflies. And although one individual might disappear before another of like species arrived, the urgent violence of their rapidly beating wings betrayed their true migrant character. Red admirals, for example, sparsely represented in autumn on Long Island and at Longport, were common in spring at Port Monmouth. Coming from the east or south, first as aged and torn individuals of the previous autumn, later as freshly colored specimens of the current year, they would feed on the beach plum flowers then drive steadily west, or set forth due north over the wide waters of Sandy Hook Bay. The beautiful Hunter's butterfly, never considered a migrant until so reported in a paper read before the New York Entomological Society in 1916, has more recently been observed in spring and autumn flights in Florida. For, according to Dr. C. B. Williams, a Mr. and Mrs. Hodges have witnessed these processions from north to south and from south to north, and, according to season, in considerable profusion.

A great swarm of the kelp fly traveling westward along Norton's Point in autumn. It was too elusive to be followed.

Of course, the peacock butterfly, *Junonia coenia*, first claimed to be a true migrant hereabouts, has now been accepted as such. And there are other migrants hitherto unsuspected, at least in this country. For both here, and more recently in the British Isles, it is this one-by-one flight behavior that has proved to be the magic key opening to us the rich treasure-house of our present-day knowledge of insect migration. In fact, this comparatively new, but now well-established method of observation, first instituted here, has enabled British entomologists to determine the migrations of various butterflies hitherto obscure. The final destinations of our own species, excepting, of course, the monarch, are still undefined.

All these opportunities for original observations were rewarding enough, but an even greater revelation was in store—the discovery of our smaller travelers. Such inconspicuous bees as the small, gray-furred *Colletes* were common participants, as were many burly bumblebees, too. This latter discovery was truly electrifying! The species found to be migratory included *Bremus pennsylvanicus*, *B. impatiens* and *B. fervidus; Bombus bimaculatus* and *Xylocopa virginica*, with the first named perhaps the commonest of all.

In spring, at Port Monmouth, the sight that unfolded was still more electrifying. Coming from the east or south, these bees would pause to feed on beach plum flowers before swiftly whirling away toward the west. Or impetuously rising higher, high above the blossoming wild-cherry trees, they would set their courses due north and disappear far out over the wide waters of Sandy Hook Bay. Untraceable thereafter, though they are, yet bumblebees can be seen still driving north over western Long Island, which lies in a direct flight-line with that of northern New Jersey. And such flights, it seems likely, are a continuance, as the early spring monarch flights undoubtedly are, of migrations begun in lower New Jersey or even in the far South. Only marking experiments can definitely settle the question.

Wasps were more elusive, both in autumn and spring. Yet nine species, in all, were observed, with the paper makers, *Polistes pallipes* and *variatus*, conspicuously present among them. Nor should we forget the large wasp, *Campsomeris quadrimaculata*, so striking a northward migrant in spring.

But what shall we say of those still smaller and most elusive fliers of all, the many migrant diptera, more commonly known as flies. They were observed in flight, but *were* they true migrants? An impressive body of evidence seemed to deny any such concept. Not only in England and Canada, but also in this country, marking experiments seemed to show that flies were rather limited in their wanderings. This conclusion was accepted by one of our most experienced dipterologists, who remarked to the writer that "flies are inclined to remain in a restricted habitat." On the other hand, the late Dr. L. O. Howard believed that the common house fly, *Musca domestica*, possessed great endurance, and stated that "if it were obliged to fly great distances the writer has little doubt of its ability to do so."

But at our observation posts we found many trooping westward on Long Island, and southward at Longport. Not only were many species taken in autumn on Long Island also common at Longport, but, in rare cases, the flights were so profuse that only the more spectacular swarms of dragonflies and monarchs (*continued on page 552*)

Fishing with cormorants in Japan goes far back into history, although today it is largely practiced as an attraction for tourists.

Fishing with Cormorants

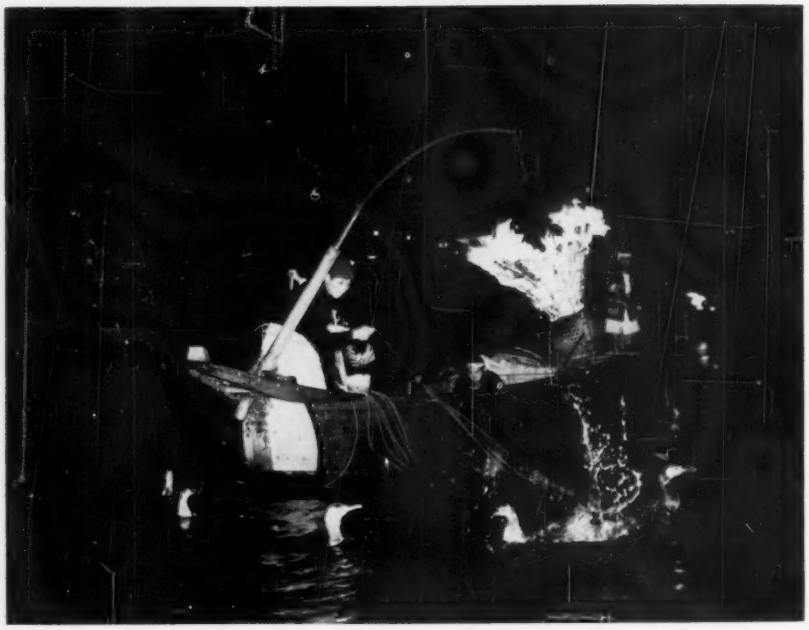
By ROBERT BRUCE WHITE

Photographs from Japan Travel Bureau

Since prehistoric times cormorants have been tamed and taught to practice for the benefit of Chinese fishermen the art to which they were ordained by Nature. Pelicans, too, although equipped with the best gamebag or creel ever carried by an angler, have also been domesticated in the upper reaches of the Indus River. But they are inferior to the cormorant, much less dependable, industrious and efficient. And, for at least twelve centuries, the Japanese have used cormorants for fishing—in recent years mainly as a tourist attraction. In all Nature there is no better fisher than these big, black, somber birds.

From shallow punts on the North River above Canton, on bamboo rafts in the canals of Foochow, in sampans on the broad Yang-ste, cormorants are still at work, I am reliably informed, just as they were before and during the war, when their obedience and intelligence used to fascinate me no end. Let us watch a fishing team at work amid the painted junks on Shanghai's Hwang-pu.

Crowned with a huge straw hat and wearing faded blue trousers and jacket, an old woman crouches amidships. Perched before her on a crossarm of her sampan, six or seven birds await her command. Around the neck of each bird is a hempen or leather collar just tight enough to prevent marketable fish from slipping below, yet loose enough to allow small fry to slip by as food. Their wizened mistress, gazing into the water, suddenly whistles and raises a bamboo cane to prod any reluctant bird off his perch. Springing a few inches into the air, they dive head foremost into the river. Using their big webbed feet for propulsion among vegetation and rocks, and both wings too, when needed, they swim with remarkable grace and swiftness, spiralling both to descend and ascend. Their search is quite thorough, the muddy waters of the Hwang-pu offering little hindrance, and apparently they can hear their prey when unseen.



Japanese practice is to fish with cormorants by torchlight and after sunset. Their birds are well trained and disciplined and fish while tethered. to their master's boat.

Now one of the birds has caught up with a small yellow perch, which he nips with his strong hooked mandibles. Because he usually swallows his food while above water, he rises momentarily to the surface, gulps it down, then returns to the chase. Alongside the river bank another cormorant has captured an eel which, being longer than his pouch, is now protruding from his beak; and at the command of his mistress he returns for aid in disgorging his prize. Deftly she runs her fingers along his neck, now greatly distended by the eel and a perch that preceeded it there. Out on deck pops the slithering eel, followed by a flopping perch. As a reward the bird is fed a small perch or minnow, after which he may return to duty, or, if tired, to resume his perch for feather preening and moody contemplation of the scene.

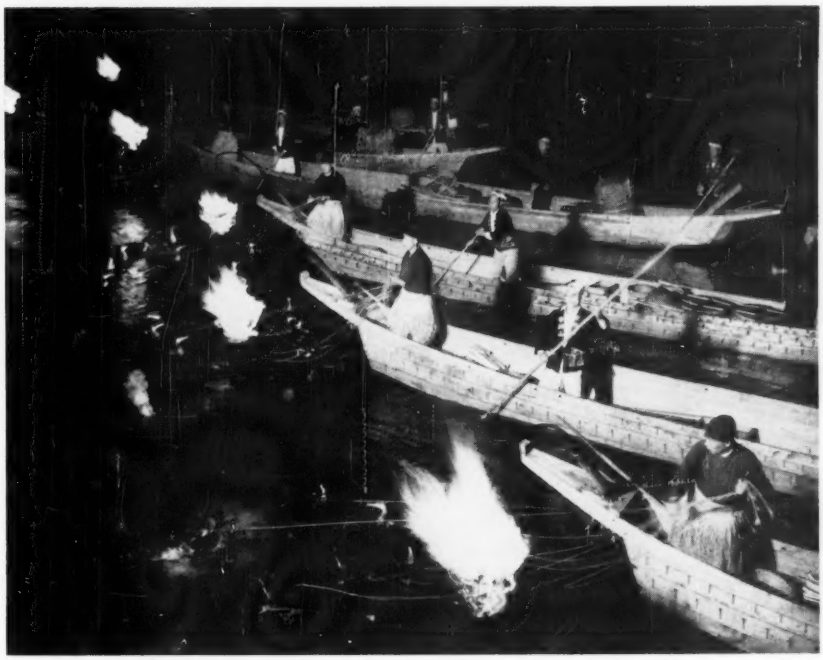
Meanwhile another bird has surfaced with a trout held tail-first in his bill. This he cleverly tosses in the air, catching it headfirst before downing it. This he does in self-protection, because if the fins are not laid properly back against its sides they may injure his throat.

Still another bird, a youngster probably, is having trouble below. He has tackled a fish so big and troublesome he is likely to lose it, and two of his pals are coming to the rescue, whether for comradely motives or in hope of capturing it themselves, we cannot judge. There is a real hubbub fifty yards offshore, both birds and fish putting up a genuine fight. This time the fish escapes, which is a rare thing in this business, and the birds resume their individual pursuit.

Doubtless some birds are more expert than others. One has surfaced and is swimming sillily about, his neck erect and extended to maximum capacity; he really is loaded and must be whistled in at once. But another member of the fleet, even after long absence below, has nothing to show for his labors; perhaps he has been specializing in edible small fry. Weary and crestfallen, he tries to resume his perch, only to be curtly ordered back to duty. Eventually the area is fish-free; all birds are whistled in, each receives his special reward, each resumes his perch, and their Chinese owner hoists sail for more fertile fields. It is especially interesting to observe several cormorant-fishing boats working together on the Yang-ste, where every bird knows exactly where he does or does not belong.

In various districts of Japan, notably in Gifu on the River Nagara, cormorants have been employed for at least 1250 years. The art is mentioned in the *Kojiki* classics compiled in A D 712, and is probably much older. Japanese practice is to fish by torchlight after sunset. And their birds, extraordinarily well trained and disciplined, fish while tethered. A "fishing exhibition" at Gifu is a tourist must, and one long to remember.

In the high prow of their narrow craft, several of which embark at one time to float flotilla-like downstream, stands the master-of-the-cormorants in picturesque costume. He has a dozen birds at his command. In the stern his oarsman manages the curious craft, and a third crew member, called the *kako*, is seated between them. *Kako's* duty is to make as much noise as possible by shouting and striking a bamboo instrument of the same name. This din is supposed to keep the birds interested in their work. Around the neck of each bird is the usual collar, and around its body is a cord and whalebone harness by which it is lifted in and out of the water. To this harness is looped a thin rein of spruce fiber about fifteen feet long. When the fishing area is reached a huge torch, suspended by a bamboo davit from the bow, is ignited. And when it is burning brightly, the master lowers his birds, one by one, into the river, gathering together all twelve birds' reins into his left



Several fishing craft embark at one time and float flotilla-like downstream. Each master of ceremonies, picturesquely costumed, has a dozen birds to command.

hand while *kako* starts his din in a most efficient manner.

Immediately the birds set to work in the jolliest of fashion, diving and ducking for their prey, which come to investigate the blaze of light over the dark waters. With a dozen bobbing birds in tow, it is difficult to imagine a busier man than their master. Each rein must be handled so dexterously that even if the birds go this way and that, which they sometimes do, there will be no fouling of the reins—no mean trick in itself. Equally important to the success of the mission, he must constantly watch his flock for the moment any member becomes fully gorged. As we learned in China, this is detected by the silly way in which the bird swims about. Then the master must shorten rein, bring it alongside, lift it on board, force open its bill, squeeze out the fishes, and start it off again—all with his right hand while his left never for a second snafus the reins of eleven other birds. This he does with remarkable coolness and adroitness. And when you know that a well-trained bird may gobble as many as 100 *ayus*, trout, on a single excursion downstream, you understand how really busy the master is.

Watching the team at work is fascinating, but no more so than observing the conduct of his troop before and after work. Each bird knows with jealous pride his own number and place in the picture. But none knows it any better than *Ichi*, the #1 cormorant, who is usually senior in years, experience, and talent. *Ichi* enjoys with his master the position of honor up front where he perches on the gunwales facing outward, unlike his Chinese cousins who perch on a cross-arm wherever they please. More important, *Ichi* is the last to be put into the water, first to be fed when work is done, last to be caged when the journey is over. No hard boiled major-general was ever more pompous and touch-me-not in demeanor. From young #12 to old *Ichi*, each bird knows his place. Just let #4 be launched before #5, or put #11 where #9 belongs on the gunwales, and there is a squawk to high heaven from the whole gang, and none more vociferous than their pompous leader's.

Shaking and preening themselves on the way home, flapping their wings to dry them, indulging in old-maidish tiffs with their neighbors, and occasionally discussing the night's catch with loud ha! has! and gobbles, they are quite amusing—if you can tolerate their unholy stench. But as they stare solemnly into the night, twisting their long necks from side to side, they remind you of snakes, and their black plumage gives them a rather sinister appearance. Humorous or sinister, Japanese or Chinese, they are certainly clever birds.

The Japanese practice, I was told, is to capture wild adult birds for their current fishing exhibitions, whereas the Chinese rear their birds in captivity, which possibly explains why the latter never clip their birds' wings or employ tethers. Strangely, Mother *Lu-tze*, as Mrs. Izaak Walton Cormorant is known in China, is so careless about her offspring she cannot be trusted to rear them. Instead, her big green eggs are transferred to the nest of a more dependable domestic hen for incubation and the first month's care. The hen is spared the anguish of seeing the ugly black members of her brood take to water. A professional trainer enters the picture, housing the baby fishers in a warm basket filled with cotton wool, feeding them pellets of fish and bean curd. When two months old, nursery days are over and vigorous schooling begins.

The youngsters are driven into a pond where their trainer tosses them a few live minnows to catch. After this technique is mastered, the trainer's business is to make them respond properly to a (*continued on page 547*)

Beneficial Beetle

By E. JOHN LONG

Photographs from the United States Dept. of Agriculture

Enlarged view of *Brumus saturalis*. The beetle is one-eighth of an inch long and distinctively striped.

If you live in central Florida, or near Riverside, California, or in the vicinity of Brownsville, Texas, and if you should chance to see a small beetle with black-and-ivory striped wings, do not harm it.

Unlike the Japanese beetle and other predators of the large beetle family, this is a friend, and a promising newcomer. Because it does not yet have a common name, and because it seems to be a good sort, I shall take the liberty of calling it Brumus, from the first half of its scientific name, *Brumus saturalis*.

Brumus is one of several beneficial insects discovered by a U.S. Department of Agriculture explorer, George W. Angelet, during a two-year (1953-54) roving assignment to Pakistan and India. That is, Mr. Angelet discovered this lady beetle's fondness for such insect pests as aphids, mites, scale insects and mealybugs. In addition to Pakistan, whence the first specimens were shipped to the United States, Brumus occurs all over India, Ceylon and the Philippines, and at Lindi, Tanganyika Territory, East Africa.

Eggs, averaging 12, are laid shingle-like in crevices along a stem or in overlapping leaves.

So much for the Brumus ancestry. Now how has it been behaving since it came to America in 1954? After a brief quarantine at Moorestown, N.J., two shipments were sent to the Fruit Insects Laboratory of the Agricultural Research Service in Orlando, Florida. One colony of six beetles was released immediately on the laboratory grounds. They seemed to know what they were supposed to go for, because they headed directly for a nearby grapefruit tree and began to search for food. The second shipment was placed in rearing jars.

A day-old *Brumus* larva at the right attacks a much larger aphid

Entomologist Allen G. Selhime, of the fruit insect field station, who is making a special study of Brumus, has already learned that the life cycle ranges from 19 to 31 days, depending upon temperature and available food supplies. Egg clusters average 12 eggs, which hatch on the fifth day. The larva goes through four stages, but has an appetite for citrus blights from the first day. This is, indeed, an asset.

In order to determine just how useful Brumus may be when large colonies of them have been established in citrus and vegetable-growing areas, the new laboratory offspring were fed green citrus aphids, the melon aphid, black citrus aphid, the citrus mealybug, green scale, eggs and nymphs of the citrus whitefly and the cloudy-winged whitefly, and eggs of the citrus red mite. These weird creatures they relished, but when the cabbage aphid was offered, most of the Brumus larvae and adults would not touch it at all.

A total of nineteen colonies of this likely immigrant have been released in Florida, and four shipments have been sent from Orlando to other places: 40 larvae back to the Moorestown laboratory; 36 adults to Riverside, California; 65 adults to Brownsville, Texas; and 78 to Mexico City. Releases in Florida, totalling 1213 larvae and reared adults, have been made in Orange, Lake, Marion, Indian River and St. Lucie counties.

In addition to the conspicuous ivory and black stripes on its wing covers, Brumus may be recognized by its oval body (about 1/8th of an inch long), brown head and thorax, and black eyes. No other beetles in Florida, and probably no other in the United States, have similar markings. Brumus is a live wire, a very active creature that runs rapidly over plants and takes flight readily. When disturbed, as in handling, it may "play possum," drawing up its legs and remaining quiet for a while.

The Florida colony releases were made in groves on a no-spray program, in order to give the newcomer the best possible chance to become established. Temple orange and tangerine groves were selected when possible, because they put out flashes or shoots of new growth more readily, and thus furnish a better supply of aphids than other varieties of citrus.

While it is a bit too soon to (*continued on page 552*)

1. Walking along a sidewalk on a May morning you find it and the base of a tree strewn with chips. What does this tell you?

Are You A Nature Detective?

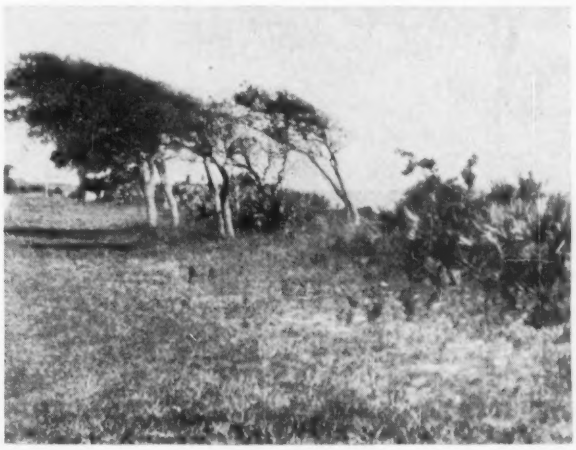
By DOROTHY M. COMPTON

Photographs by the Author

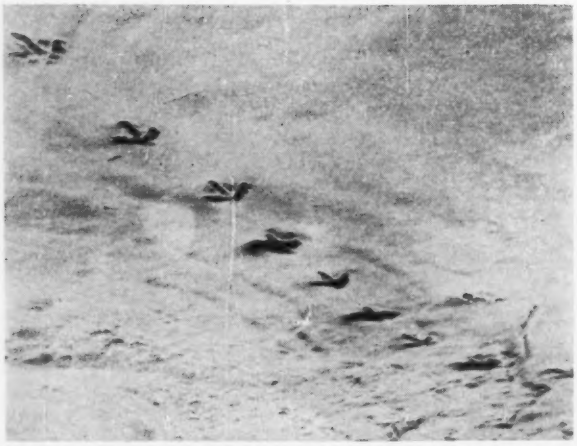
MANY famous people are said to find relaxation through reading mystery stories. I, too, like to study clues, but my favorite authors are not Ellery Queen, or even Sir Arthur Conan Doyle, or any other mystery writer whose "whodunits" appear between the covers of books. My favorite writer of mystery is Nature, whose plots are ever varied and whose clues are often as elusive as they are fascinating.

Here are some pictures that represent clues to something that has happened in Nature. They suggest many other clues that the seeing eye of young or old may detect outdoors, and thus learn to read the mysteries of Nature's ways. See what you can deduce from the pictures and the clues; then check your solutions with those on Page 550.

2. Walking in the woods, you find a tree with large, rectangular holes chiseled in it. Who was the "carpenter?" ←



3. What is the reason for the one-sided "haircut" of these trees near St. Augustine, Florida? →



4. What clues do you find in these tracks? Was their maker walking? What was it?

5. This clue is related to #4. What does it reveal?

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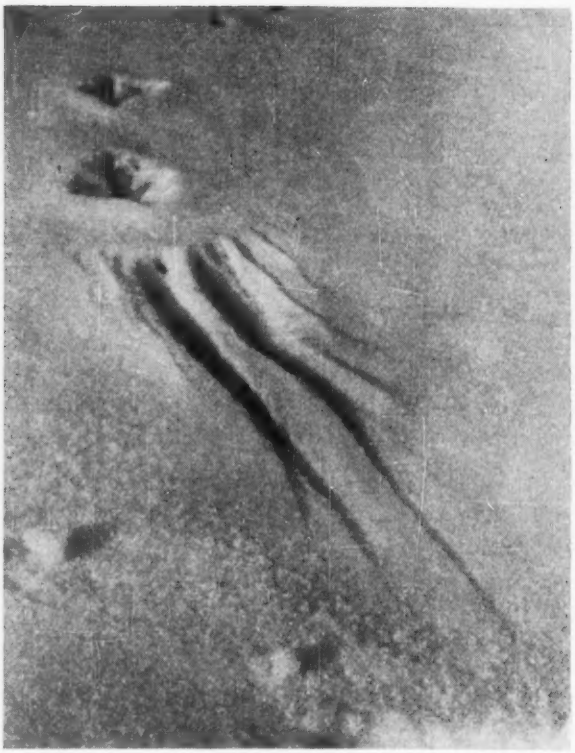
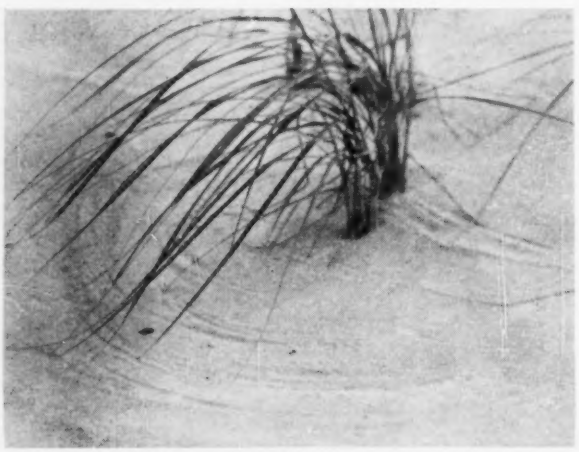


6. This scene (below) provides clues to two creatures. Can you guess which?



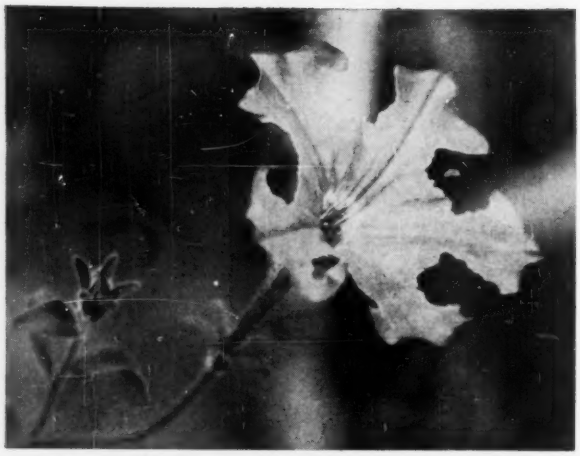
7. Do the circular tracks beneath the dune grass suggest the trail of an animal?

8. What clues do you find in the tracks left below on this snow-covered sand dune?

9. Here is the stump of an oak felled by hurricane and salvaged for timber. Here you can read a record of this history of the tree. What do the drops of sap between the bark and the wood tell you? What do the tree rings reveal about the life of the tree?

10. Here is a tree that has grown in a strange shape. Does this suggest anything in its past that might have to do with Indians? Does it suggest any relationship with early settlers? What other reasons might there be to account for the deformity of growth of the tree?

11. Here two youngsters find a turkey-tail fungus growing on a stump. Is it helping to turn the stump back to soil? Is the wood under the fungus decaying faster than the wood where there is no fungus?



12. How did this "freak" petunia in the garden get that way? How did the five notches become so regular?

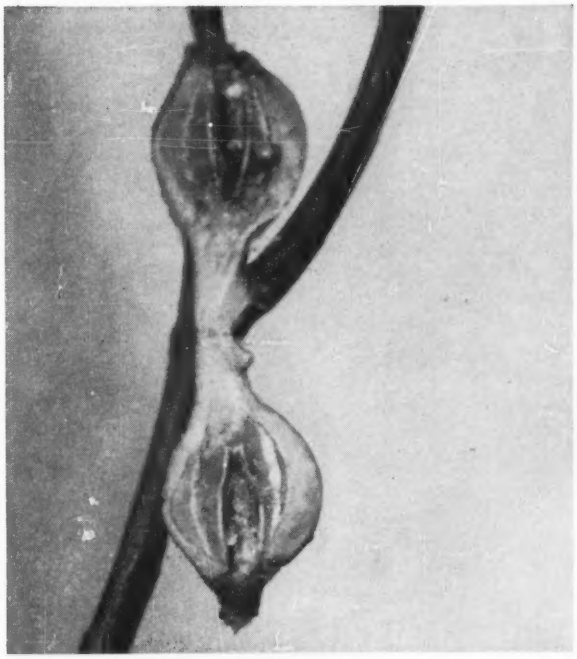
13. There are many "sermons in stones" that you may read in the outdoors. What do the layers of shale projecting from a hillside provide as clues?

→

14. Here is the twig of a silver maple marked by a circle of rings left by the fallen bud scales. What does this tell you?

15. There should be no difficulty in deciding what has happened here. The clues are unmistakable and all too frequently to be found. Is it left by some kind of insect? Or, maybe, a worm?

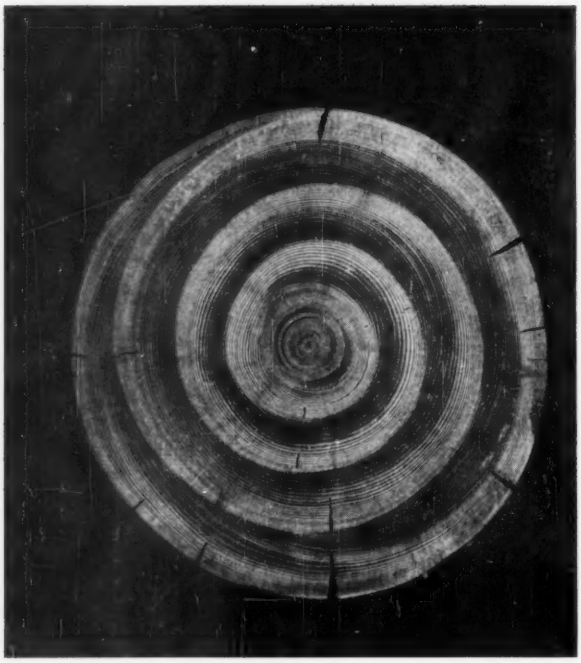
16. What bird or mammal spent the night at the foot of the stump below?



17. What is the story told by the swellings on the pussy-willow at the left and by the cut-open swelling shown enlarged above?

18. What is the record left on the sand around the plant of seaside goldenrod? What birds had been there?

John R. Meyering of the State University of New York's College of Forestry holds a fifteen-inch diameter of a southern pine only twelve years old. Inset on the large diameter is a cross-section of a 40-year-old spruce that measures only 7/16ths of an inch across. The southern pine grew in a favorable climate in the South, with plenty of sunlight and away from other trees. Because of its advantages, it grew so fast its wood is weak and of limited value. Professor Svend O. Heiberg, head of the College's Silviculture Department, says this southern pine is an outstanding example of rapid tree growth.



The unique spiral pattern of the tree rings in the specimen at the right leaves forestry experts scratching their heads for an answer. The spiral continues from the core of the tree right to the outside, in an unbroken line. So unique is this that it was featured in a Ripley cartoon.

Rings Yield Tree Secrets

By HENRY W. SCHRAMM

Photographs by Harold J. Nisnoff

Tree diameters, the circular segments cut from felled trees, are telling a tale to foresters that may some day mean larger and healthier forests for lumber, for recreation, and for wildlife. It is the story of the effects of outside forces on the life of a tree, and vividly bears out the forester's contention that wise forest practices mean bigger, healthier trees.

The key is in the study of annual rings. These, by their shape and distance apart, give clues to the environment and problems encountered by the tree during its life span.

Each year trees grow with great vitality in the spring. At this time, thin wood cell walls appear. These are light in color. The annual growth is concluded with thicker cell walls, giving a denser, thus darker, appearance. The annual ring is composed of a light and a dark portion, enabling us to distinguish one annual increment from another.

This means of measurement of a tree's age and activities is most useful in the temperate zones. In the tropics this decisive annual separation does not usually occur because of the continuous growth in such climes.

At the State University of New York's College of Forestry at Syracuse, students are learning the "whys" of tree development from an exhibit of ring diameters. The life history of a dozen different North American species are told in diameter segments prepared by John R. Meyering.

Some of the trees shown grew with rings in eliptical shapes to compensate for leaning positions on hillsides. Others indicate the effects of disease and insect infestations. Past histories show up irrefutably in the diameters.

One tree, in mature form, was discovered in an Adirondack bog. It was only eighteen inches tall. A close study of the tree diameter, seven-sixteenths of an inch wide, showed forty annual rings spaced only 1/180th of an inch apart.

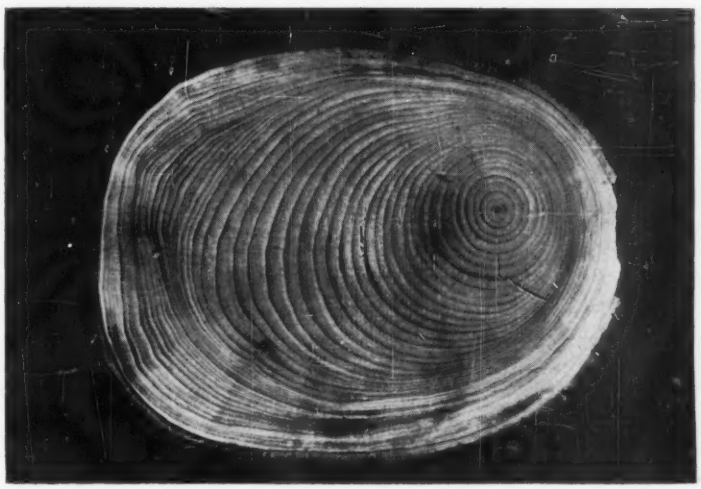
The results of tree growth under proper forest management procedures, including thinning, are compared, in the collection, to those of trees that were cramped and shaded throughout life. Tree rings are truly revealing the written biography of the tree.

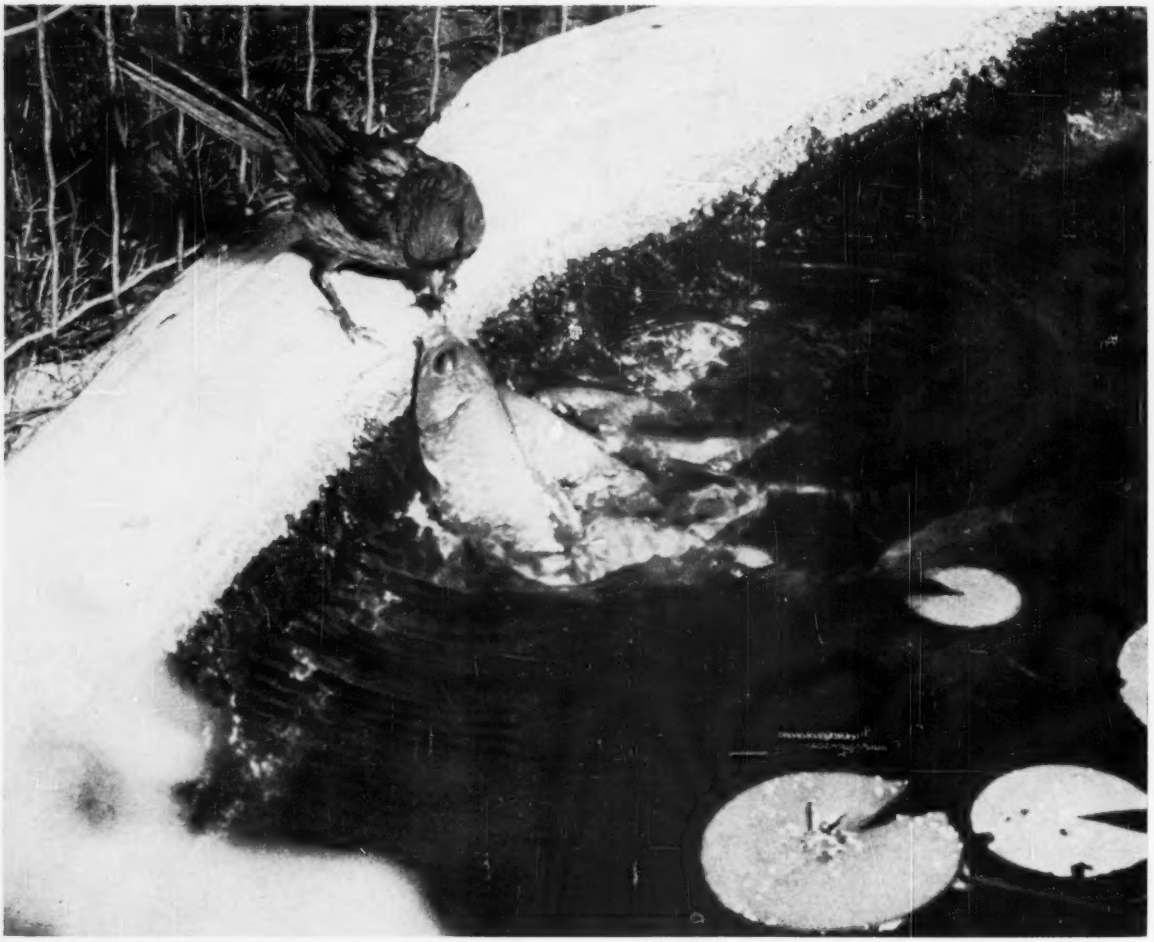
The apple tree, diameter of which is shown above, grew near Syracuse, N.Y., and is an example of the need for protecting trees against open wounds. During its early years, it grew well. Then a branch was broken off. It started to heal, but an infection occurred. The disease spread and centered in the area near the tree's heart. Still alive, the tree was attacked by insects, probably through the gap left by the wound. Near the diseased area, these insects built a series of galleries. The tree fought back. Healthy outside rings covered over the wound, but could not remove the rot, which gradually occupied the center.

The cross-section of white pine (upper right) shows the results of wise forestry practice. The tree grew in a plantation, with all of the trees being planted during the same season. For eight years the rate of growth, as shown in the rings, was good. Then associate trees competed.

Virgin timber is represented (right) in this diameter of a 440-year-old eastern hemlock from virgin forest land near Fourth Lake, New York. Toppled by a windstorm, in 1944, the tree recorded its slow growth in close-together rings that reveal a cramped space caused by too many trees occupying a limited area. Companion trees were approximately the same height, sparse in foliage, and of the same diameter.

Eccentric growth is shown in this diameter of a 54-year-old basswood tree that grew near Syracuse, N.Y. The anatomical center, or heart, is off to the right side. The tree grew on a steep hillside, leaning badly downhill. In order to compensate, the tree grew more wood on the uphill, or left, side. For the first eight years the tree apparently grew straight upward. The tree rings around the core for the first eight increments are regular and evenly spaced. Then it was tipped, and compensation began immediately. While basswood and other hardwood species will put on more wood (called tension wood) on the uphill side, the softwoods, such as pine and spruce, compensate on the downhill section, which strengthens that part and keeps it from bending further. Foresters call this "compression."





Cardinal Feeds Fishes

By PAUL LEMMONS

Photograph by the Author

Onnie Baker was certain that his eyes were playing tricks on him. It was August 2, and when he glanced at the goldfish pool in his yard in Shelby, North Carolina, he saw what appeared to be a male cardinal feeding the seven goldfish in the pool. Mr. Baker concluded that there must have been something faulty about his observation, so did not mention the incident until the following Sunday. Then he risked describing what he had seen to his wife. Mrs. Baker was the first of many unbelievers, but careful observance of this strange cooperation convinced her.

However, the Bakers set up a watch. They both saw the cardinal return from a foraging trip, fly to the top of a five-foot wire fence that surrounds the pool and chirp. At this signal the goldfish appeared at the pool's edge, waiting expectantly. The cardinal dropped down to the pool, chirped again and doled out tidbits to the open-mouthed fish. When the supply was exhausted, the bird went foraging again. On his return he went through precisely the same ritual and always returned to the same spot at the pool's edge.

Among the doubters was this writer, who is also staff photographer for *The Shelby Star*. After witnessing the strange cooperation between cardinal and goldfish, and looking at the evidence recorded on the camera film, I had no choice but to believe what I had seen.

Close-up of a defaced boulder on the Mt. Anderson trail in Olympic National Park. It rests near the edge of a small, snow-fed lake. The area makes an excellent campsite for climbers and hikers. The man at right provides a comparative figure to show size of the inscription.

Zealous Vandal

By FRANK OWEN SHAW

Photographs by the Author

As much a part of a wilderness shelter itself are the names and initials, dates and places, that seasonally grow on the shelter's rafters, beams and shades as they gray with age. Those who use these welcome havens, when opportunity or need arises, may not approve such carvings and brandings but the idle traveler will search the shelter for the names of persons he knows, nevertheless.

According to law, there are penalties for destroying or defacing government property, and scrawling one's name on a park shelter is a violation of that law. But one must assume that the National Park Service considers this a lesser form of vandalism, for prosecutions are almost unheard of.

However, a new form of defacement, much more serious in scope, has appeared in Olympic National Park. This new violence to the natural scene is through the use of rock faces for Biblical inscriptions. It is extremely doubtful that responsible officials in the religious denomination to which this offender belongs would sanction the practice of using national parks for such purposes.

Two inscriptions were found this year in the Mt. Anderson area of Olympic National Park, and others have been reported seen along the High Divide trail and on the sides of the Bogachiel Peak shelter. No doubt there are more, wherever the offender, with his bucket of paint, his brush and his misguided zeal, chanced to roam. In white letters a foot high and more, they startle some viewers and disgust most.

Littering and defacing the outdoors is, of course, a national problem being attacked by such groups as Keep America Beautiful and its affiliated and supporting organizations. Our national parks, the property of all the people, and theirs to cherish, are annually the victims of thoughtless as well as deliberate defacement.

Together with its other many problems, the National Park Service is now facing the problem of finding an appropriation for paint remover and detaching a ranger to erase the efforts of one zealous vandal.

Hikers reaching the top of the moraine high above Anderson Glacier get a view of this boulder as they take in the fine panoramic sweep of Mt. Anderson and its many jagged peaks.

The polecat of Europe is known to science as *Mustela putorius putorius* and belongs to the Weasel Family.

The Real Polecat

By GEORGE BALLOU

Photographs by Barbara Ballou

MY MEETING with the real polecat was a pure accident, and it happened in Switzerland. It was a moonlit night in June and the air was redolent with the promises of early summer. Below on the left lay the river Limmat, which joined the Lake of Zurich not far away. On the right stood an old farmhouse with a pile of wood near the door, and farther down the road stood a line of new apartment houses.

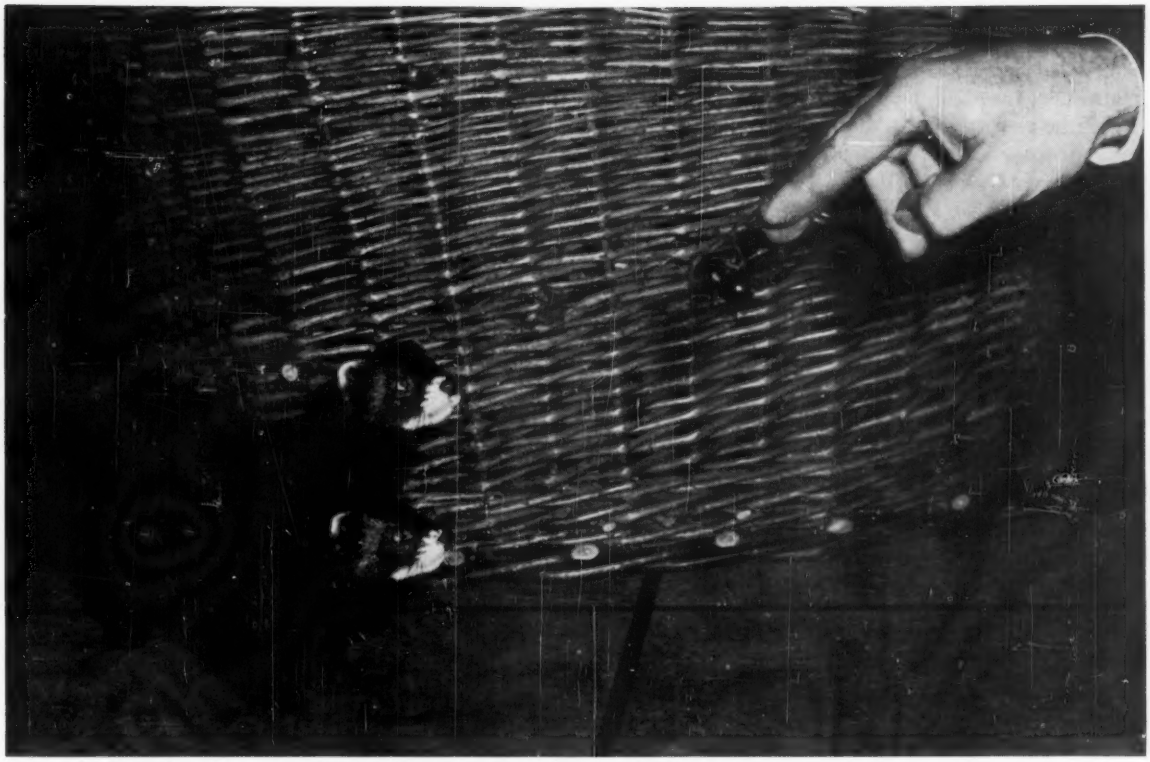
A friend and I were walking to my apartment, and I was boasting of a savory Swiss dish my wife would have ready for us when we got there. Suddenly a lithe black form bounded across the road, followed by five or six smaller forms, all headed for the river. Their every leap seemed like a dive.

"Otters!" I cried and ran after them. One of my dreams had been to have a pet otter.

The polecat stands on its hind legs to investigate what is currently being offered as food.

The mother disappeared over the roadside ridge, followed by most of the babies. But two were confused and I had time to seize one. Holding him against my chest, I cornered the second one in the grass. My friend tried to help by running back and forth and asking, "What shall I do? What shall I do?"

The captive in my hand gave a shrill squeal, then suddenly I smelled a pungent odor and felt a stinging jab in my thumb. I grabbed for the second baby, but missed. The little fellow hissed and chattered and wavered from one side to the other. Then, with a second grab, I had him (or her) and the musky smell doubled in intensity. As the two bit and squirted and screamed, I ran the several blocks to the apartment



Mary and Bill, the polecat duo. As the pair matured the white on their faces became more pronounced and in sharp contrast to their black fur.

and kicked at the door to the accompaniment of an ear-splitting shout. My wife appeared, her face pale.

"Are you all right?" she gasped.

"A box! A box!"

She hurried away and came back with a box, remarking, with relief, "From the screaming and the way you held your arms to your chest I thought you were dying."

A moment later my friend arrived, and the three of us peered into the box at two black babies that resembled minks, smelled like skunks, and showed the ferocity of tiny wolverines. Every time we moved they screeched, so we finally left them in peace.

The two captives were not young otters but close relatives, being baby European polecats, *Mustela putorius putorius*. Like otters, they are members of the Weasel Family. They live near buildings or water, are good swimmers and fishers, and also fair climbers. They eat almost anything they can catch, including rodents, birds, lizards, fishes, frogs, occasionally poultry and even the lowly earthworm. They normally kill only what they can eat, and may drag it to their den.

The two babies could have been born in an abandoned fox hole, an old barn, a hole in a tree, or in the rocks. Their mother probably mated in March and the young were born in a soft grass nest in the month of May. Five to six is the usual number, which is just what we saw, and the eyes of the young open on the fourteenth day.

These animals are nocturnal like the skunk, and I personally experienced another skunklike trait—their ability to emit musk from a gland under the tail. Compared to the skunk's artillery, their's is mere child's play, but still pretty effective because the reek lasted for days. In England the polecat was formerly called the "foul marten," and the "true marten," the "sweet marten," or "sweet mart." Little wonder that early American settlers thought of home when they met the American skunk, and called it a polecat.

The polecats were given milk and beaten egg, and, at first, thanked us with a squirt and angry chattering. Within a few days, however, they stopped squirting and even let us carry them around. We christened them Bill and Mary. Mary was shy although the more friendly of the two, while Bill was fearless and occasionally showed anger at being petted. They were very agile and spent hours wrestling like kittens, all the while giving peculiar buzzings, and now and then a high trilling cough. They were little carnivores par excellence, and when given meat each dragged a personal piece into a different corner of the cage and gobbled it down, spluttering while eating. Done, they fastidiously washed jaws, paws and fur.

The duo spent most of the day sleeping or dozing, broken by playful interludes, and perhaps a run to the cage front in hopes of being given tidbits, then back to the nest. At dusk they became wide-awake, stretched, yawned and climbed down the tree in their cage and

rushed up and down the wire, waiting for supper.

As the pair matured, the white on their faces became more pronounced and was a striking contrast to their black fur. Their feet, tails and bellies were solid black, while the underfur, especially on the sides, was beginning to turn yellowish. Bill was much bigger than Mary.

One evening we freed them in the sitting room and then sat at the other end of the room and watched.

They gingerly sniffed the corners, scampered under the couch and climbed into the wickerwork chair, then went sniffing to the bookcase, Mary following Bill. Suddenly Mary dashed under the couch. Bill followed, and within seconds the room was converted into a playground. They seemed to swim through the air, dive, surface, continually buzzing and chirping. They nearly bumped heads on the wickerwork chair, then Bill fell to the floor with a thump and ran under the couch, out again and sprang to the couch, followed by Mary at the far end. They ran towards one another, Mary abruptly turned but Bill had her by the tail, she buzzed, turned around and they went rolling and scratching over the cover.

We had already had pet skunks who played with *us*, and we hoped to be likewise admitted to the polecat fold. So I gently darted my hand toward them, yanked it back and imitated their sounds. Bill knew I was no real polecat and he refused to play, but Mary was not so sure and with a chirp she ran toward me, stopped, turned around, ran away then returned with a confused chatter. When I hurried across the room, buzzing as best I could, she followed. I stooped down and offered my hand, then pulled it back. Mary seemed just on the verge of wrestling with my hand but somehow lacked the courage, and scampered away with a mystified trill.

By the end of the year Bill was more than two feet long, and he and Mary had thick shaggy coats of dark fur over a lighter underfur.

A visitor once asked why we had not trained them to catch rats. According to one account, young polecats can be trained as "ferrets" and will enter a rat hole, chase out the rat and catch it in a few bounds.

Maybe it was their way of getting back at us for not having trained them, because one night the two did something quite ferret-like. Near their cage was another cage holding six jerboas from North Africa. The jerboa is a fascinating desert rodent that looks like a miniature kangeroo and travels in long leaps. We were mighty fond of the jerboas. Neither Bill nor Mary had paid any attention to them.

Then, one morning, we entered the kitchen and saw that the jerboas' cage door had been broken open, and near it were streaks of blood. In one corner three dead jerboas lay in a neat pile, and a fourth lay in another corner, while two terrified but untouched jerboas crouched under the shelf in their cage. It was a miracle that they had not been killed as well. Nearby, the polecats' cage door was open, and on their shelf Bill and Mary were sound asleep in a furry heap. Mary awoke, eyed us, yawned and stretched her forelegs and arched her back, and then closed her eyes with a lazy sniff.

As badly as we felt we could not find it in us to scold them. But our advice is that while the real polecat makes an interesting, and even amusing pet, beware as to who lives next door!

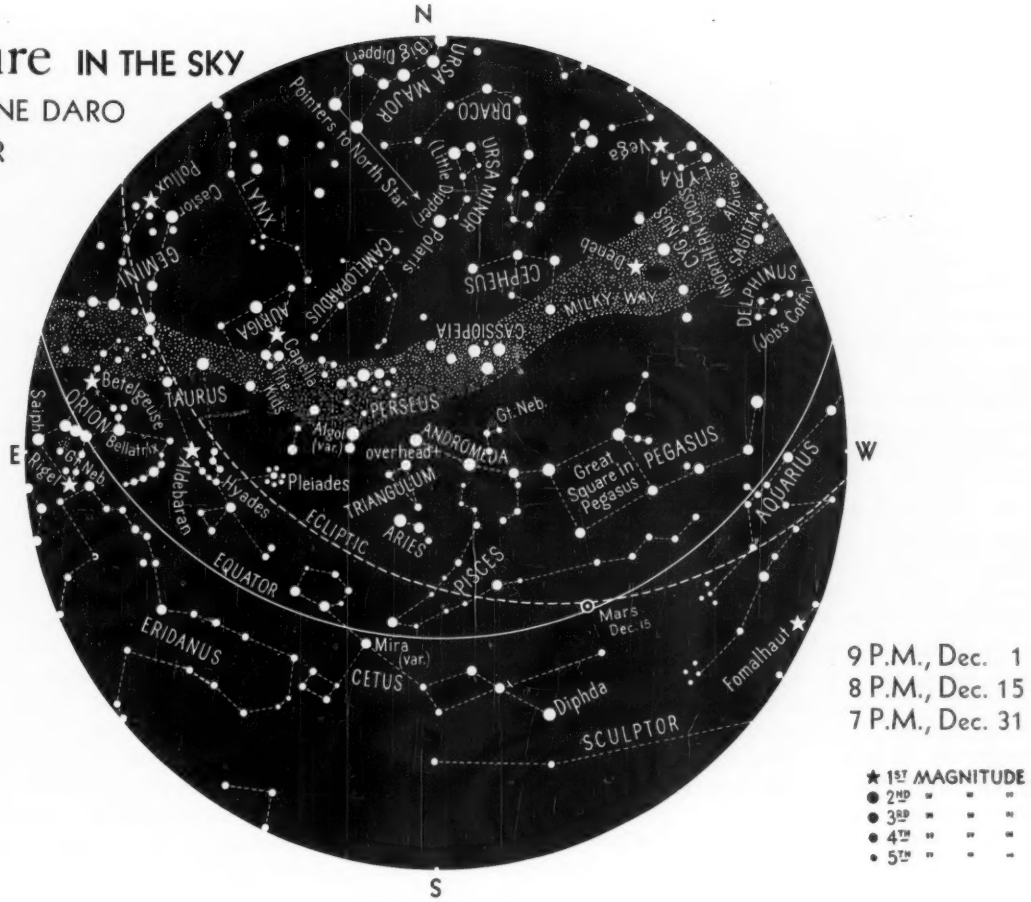
CYCLE

With straight unerring flight
Does bumble-bee alight
On the sea-blue gentian;
With devastating will
Driv'n by instinctive skill
He breaks the tension
Of tight-locked petal wall,
Which at his urgent call
Admits intrusion;
Some secret seconds, then
In that sweet sapphire pen
He has reached conclusion;
Serenely satisfied,
Sails on resistless tide
With his prehension —
A boon for you and me;
Already we foresee
Next year's bright gentian.

John F. Davidson

Nature IN THE SKY

By SIMONE DARO GOSSNER



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. Times given are for Local Standard Time.

Progress on the Earth-Satellite

In the October, 1955, issue, we discussed in these columns the recent White House announcement that the United States would attempt to build and launch an artificial satellite at some time in 1957 or 1958. At first, we could only surmise what would be attempted and the means by which the satellite would be launched. In the course of the last few months, the scientists in charge of the project have released a number of progress reports. These give us an evaluation of the accomplishments—and failures—of the past year. They also describe the manner in which they intend to launch the satellite and how it may be observed.

As may be expected, the most difficult part of the project is that of the actual launching. Everything else, and particularly the design of the satellite itself, must be subordinate to the problem of getting it aloft.

The launching apparatus will consist of a three-stage rocket. The three parts, assembled together, form a cylinder approximately seventy-two feet long and forty-five inches in diameter. The gross weight, including fuel, will be about eleven tons. All three rocket motors have already had their first runs.

The satellite will not be launched "straight up." If such were the case, it would have to be ejected into its orbit at right angle to the path of the rocket, and the momentum acquired by the latter would be lost to the satellite. It is more efficient to send the rocket on a gradually curving path and to release the satellite when the path of the rocket becomes parallel to the surface of the earth. In practice, this is what the launching apparatus hopes to achieve:

The first stage of the rocket will travel upward in a

slightly curved path, burning the fuel contained in the first section. The fuel will be consumed at a height of about thirty-six miles above the earth. At that point, the first section breaks away from the rocket and falls back to earth. At the same time, the fuel contained in the second section begins to burn, and the second stage of the rocket continues its curved flight upward. The fuel in the second section will be spent by the time the rocket reaches a height of 140 miles, but the apparatus will continue to go up on its own momentum.

During this "coasting" phase of the trip, an electronic mechanism contained in the second stage will spin the third section—and the satellite it contains—into the satellite's orbit. Having accomplished this, the second section, in turn, breaks off and falls back to earth. By this time, the third stage will be at a height of 300 miles and its trajectory will have become parallel to the surface of the earth. The fuel contained in the third stage will then ignite in the manner of a firecracker and shoot the satellite off into its orbit.

From that time on, if everything goes according to plan, the satellite will start orbiting around the earth like a tiny moon. Unfortunately, science is taking a giant step from theory to practice. Many fingers will be crossed, and it is safe to assume that the first experiments will at best approximate the steps outlined above.

If the ideal conditions of launching are met, the satellite will move in a roughly circular orbit, 300 miles above the surface of the earth. Slight errors in the speeds and trajectory of the three-stage rocket will cause the orbit to be elliptical. In that case, the designers intend that the satellite will come no closer than 200 miles at nearest approach, and will extend no farther than 1500 miles at its greatest distance from earth.

Because of the considerable amount of fuel required to propel the launching rocket, the weight of the satellite itself is greatly limited. It will be a sphere 20 inches across and will weigh 21.5 pounds, half of this being the weight of its outer shell. Therefore it will carry less than 11 pounds of equipment. This will include a 13-ounce radio transmitter, mercury batteries, various instruments to record upper atmosphere conditions, and a thermostat to keep an even temperature inside the shell. No photographic equipment will be carried, as it would greatly excede the maximum weight allowance.

The Naval Research Laboratory, at Washington, D. C., is already in possession of one satellite and hopes to launch it in the fall of 1957. If the experiments are successful, a dozen satellites will be launched in the course of the International Geophysical Year (July 1957-December 1958). The launching will take place at Patrick Air Force Base in Florida.

We must remember that the orbit of a satellite—man-made or otherwise—always lies in a plane that passes through the center of the parent planet. Since Florida is not on the Equator, the orbit will automatically be inclined to the Equator and its inclination will be at least equal to the latitude of Florida. Actually the angle of firing has been chosen to give it a slightly greater inclination, ranging from 35 to 45 degrees, so that the satellite will pass over most of the temperate regions. The original firing will be aimed from Cape Canaveral, Florida, toward the northern edge of the Bahamas. The plane of the orbit is fixed in space and is independent of the earth's rotation. Thus, as the earth rotates, the satellite will cross the Equator 1500 miles to the west of its previous crossing after each trip around its orbit. One trip will take about 100 minutes.

If all the above conditions are fulfilled, the satellite will be observable from most of the continental United States. It will however be extremely hard to see. In the daytime it will be lost in sunlight. At night it will be inside the shadow of the earth. The only favorable time will be during morning and evening twilight. Its apparent size will be somewhat less than that of a golf ball 60,000 feet away, and its speed would take it across the apparent face of the moon in less than two seconds. In order to facilitate visual observation, it will be given a mirror-like surface that will reflect the maximum amount of sunlight. Thanks to these precautions it will be possible to see the satellite with ordinary binoculars.

Teams of amateur visual observers are being recruited and trained all over the world. Their task will be to get evidence that the satellite is actually orbiting, and, as it slowly spirals back to earth, they will also be relied upon to report on its final disintegration. In addition to this, the United States is setting up ten radio tracking stations in the Western Hemisphere. The first one to be completed is located at Blossom Point, Charles County, Maryland. There will be two more in the continental United States, at Stewart, Georgia, and San Diego, California.

A final word of reassurance: As the satellite spirals back to earth, it will disintegrate completely by atmospheric friction. It will not fall on your house.

RELATIVITY

As stars speed outward,
in their cosmic race;
our universe extends itself,
expanding into space.

And mid the stars,
our thought expands . . .
but at a slower pace.

Oscar Ostlund

In the month of December the New Moon will occur on December 2 and the moon will be full on December 17.

The winter solstice, or beginning of winter, will take place on December 21, at 4:00 P.M., Eastern Standard Time.

Mercury will be an evening star throughout the month of December, setting one hour after the sun on December 15, one hour and one-half after the sun at the end of that month. It will reach its greatest eastern elongation on December 24.

Venus, still a very bright morning star, will rise two and one-half hours before the sun on December 15. Just before sunrise it will be found low in the southeastern sky.

Mars continues to fade in brightness as it recedes from the earth. In the southern sky (*continued on page* 552)

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Nature IN THE SCHOOL

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

Considering Inexorables

FOR MORE THAN THIRTY YEARS I have been a steady contributor to *Nature Magazine*. For most of that time I have had to meet deadlines, sometimes as many as fifteen a year. Fortunately, most of the time it has been a pleasure to stick to this schedule; otherwise I probably should not have done it. But, like it or not, a deadline is an inexorable obligation, whether it is the date on a promissory note, an agreed closing of the books on some project, the opening date of the trout season, or the "I do" given the day you got married. The term applies to those with a conscience, or those ruled by logic.

Presumably if, by prayer or entreaty, you can get the boss to change the date we cannot use the word inexorable. Apparently something that is inexorable can be avoided, even though it cannot be changed; something that is inevitable just cannot be avoided or changed. It is inevitable that if winter comes spring cannot be far away, but it is not inexorable that we must suffer because of the cold of winter, the rains of spring or the heat of summer. We know well how to avoid these unpleasantnesses. Possibly much of our effort and ingenuity in life is dedicated to avoiding what may have appeared to be inevitable. Using the inexorable laws of logic, we have repeatedly defeated what seemed to be inevitable in the field of handling disease; of making two blades of grass grow where one grew before; of increasing the nutritive values of foods to meet important needs; of saving and improving our supply of topsoil on which our whole economy and happiness is based.

There has been a school of thought that told us that it was inevitable that eventually we would lose all our topsoil; that our populations would increase to such a point that the world could not support it; that war is a human necessity; that because we have found that agreements made by some of our enemies have not been kept we must distrust the whole world. Using the inexorable force of logic, we can defeat such pessimism. We know that soil loss to a dangerous point is not inevitable because we know how to manage and increase topsoils. We know, but have not as yet applied, rules that will keep our populations within reasonable bounds set by our resources. We have demonstrated that, even with those who have ignored agreements repeatedly, such groups can be kept under control by united action of reasonable persons and groups of persons.

Role of education

Possibly the major role of education, in school and out, is the application of the inexorable strength of logic to the correction of ills that seem to be, but not necessarily are, inevitable. True, some things such as death are inevitable, but life can be so fruitful while it lasts that death when it comes can easily be taken in stride. We should not and cannot think that when we close our books the world will come to the end. Ben Franklin in his *The Ephemera: An Emblem of Human Life* showed facetiously but effectively how ridiculous it is for us to take outselves too seriously. He used as a vehicle for getting over his story what he erroneously thought represented the life history of a mayfly. He missed the boat in some details but he got his lesson over, nevertheless.

Scientists who have licked or impaired the effectiveness of typhoid, tuberculosis, smallpox, polio and many other diseases have used the inexorable force of logic to defeat what seemed to be an inevitable law of life.

It is inevitable that we shall have to pay taxes or rent, but it is not inevitable that in doing so we shall be economically ruined. We may just have to defeat the situation by learning how to earn enough so that the disturbing nature of such expenses are no longer too unpleasant. Our minds, and the experience we or others have had, show us that somehow, using our will and strength inexorably, we may avoid what seemed to be inevitable. In *Daniel VI 8* we read of the "law of the Medes and Persians which altereth not." The story of the human race is a living example that there is a law of life that rewards those with the ingenuity, intelligence and strength to avoid what might well be disastrous to lesser beings.

Educational weakness

It is becoming increasingly evident that one of the great weaknesses of our educational system in recent years has been the dedication of our efforts primarily to helping the weak student and penalizing the superior student by offering him unchallenging programs, disciplining him to make him one of the average, and denying him the rewards that should come to him and to society should he develop his talents to the full. Repeatedly have we ignored recognition of the value of discipline. If students do not have the ability to meet our standards we lower our standards. If law enforcement seems to be breaking down we rescind the laws. If a man will not make a living, we provide him with generous relief checks. If he will not save but dissipates his opportunities, we give him a generous retirement. Of course, these statements cannot be justly applied to all situations, but by the inexorable laws of logic they apply to a situation that heads towards weakness and defeat, not towards strength, leadership and pride of accomplishment. It is ridiculous to assume that all success is based on conquest of weaker associates. Success for the strong may well save the weak from disaster. Some of us think that the doctrine of individual initiative that we have followed has given us an enviable standard of living. Certainly other nations with equal or greater resources, with longer opportunities for development and with larger populations with potentially greater heritages seem to envy and to imitate our accomplishments. We have proved repeatedly that where the strong help the weak intelligently they make themselves stronger, and where the strong dominate the weak

they frequently make themselves weaker.

In the realm of human behavior, of course, there is nothing more inexorable than pure logic based on facts, and there is nothing more dangerous than apparently logical conclusions based on invalid data. We must have our schools produce a generation trained in logic. Similarly there is little that is more inexorable than mathematics, a fact that has obviously been blatantly ignored by many politicians, by whole political parties, and by short-sighted citizens the world over. Physical science, and to a possibly lesser degree, biological science have presented us with concepts the inexorable application of which can shape the future of the world and of individuals. Teachers should recognize these situations and use them to their greatest ability.

Even politicians with a conscience and with a heart have found that they cannot forever yield to the whims of all of their supporters and live happily with themselves and with their neighbors.

Lincoln's convictions

Abraham Lincoln expressed his convictions in this whole matter ably when he wrote: "If I were to try to read, much less answer all the attacks made on me, this shop might well be closed for any other business. I do the best I know how, the very best I can; and I mean to keep on doing it to the end. . .If the end brings me out all right, what is said against me will not amount to anything. If the end brings me out all wrong, then angels swearing I was right would make no difference." In a lesser man, such as some of Lincoln's successors have been, this might lead to tragedy brought on by stubbornness. In the hands of a stubborn idealist like Lincoln, who had learned life through rugged experience flavored with a sense of humor, an inexorable conviction was a powerful weapon for good. Similarly Will Rogers, with an unequalled sense of humor, applied his technique of kindly ridicule effectively and inexorably to all men, large and small. The great tragedy to America was that he could not have lived a decade or so longer and applied his system to the problems that arose shortly after he died.

Even philosophers have applied blind faith effectively to situations of their time and held inexorably to that faith in the face of criticism and apparent defeat. One of them expressed himself along these lines as follows: "Fight on thou brave true heart and falter not through dark fortune or through bright. The cause thou fightest for so far as it is true is very sure of victory. . .The truth of it cannot be conquered." Let us make a New Year's resolution that we will try to be more inexorably resolute in supporting the things we really believe but let us not go off on a tangent on what we believe. It is worth while once in a while to write our own little version of the television feature "This I Believe." Try it at least once and then stick by it. Inevitable is the slogan for the weak defeatist. Inexorable is the watchword of the strong leader who is the master of his soul.

Shenandoah Mammals

"The Mammals of Shenandoah National Park" is the title of an excellent 72-page, illustrated booklet by Richard H. Manville issued as Bulletin No. Two of the Shenandoah Natural History Association, Luray, Virginia. Fifty-nine different mammals have been found in this Park through field observations and study of specimens, and the protection afforded by park status has served to increase their numbers. Also increased is the interest expressed by visitors to this skyline region. This fine publication describes in popular terms the various mammal residents of the Park and serves to answer the questions of visitors. The booklet sells for $1.00, and revenue from its sale is used to aid the interpretive program in Shenandoah National Park.

Flowers for Color

First published in 1954, "Drying Flowers for Color" by Sarah Whitlock and Martha Rankin has now been brought out in a new edition. This little illustrated booklet is a practical guide to a fascinating hobby for home decoration and has been most deservedly popular. It covers a quite specialized field of floral decoration and represents long experiment and experience. With its advice it is now possible to have a wealth of beautiful dried flower materials for use, especially outside the growing season. Copies are available at $1.25 from Whitlock-Rankin, 3 Gildersleeve Wood, Charlottesville, Virginia.

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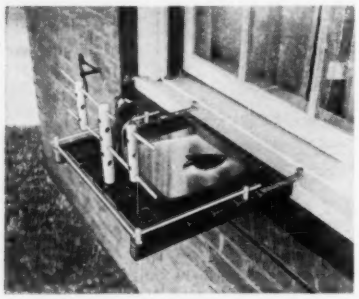
New Feeder

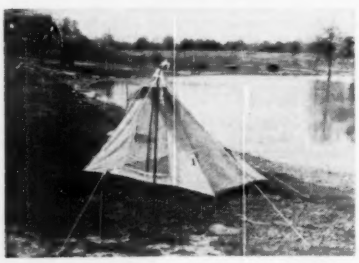
"Flight Deck" is the trade name that Duncraft, Dept. N.M., Penacook, N.H., gives to a window sill bird feeder and drinking and bathing pool. Made of all-weather duralon,



and finished in green and white trim, this feeding station has hardwood perch rails, feeding stick and four seed wells, as well as the pool. It clips to the window sill and can be attached and detached without tools. It measures 17¼ by 15¼ inches and sells for $7.95, or two for $14.95, postpaid.

Food and Feeder

A two-pound disposable package of wild bird seed, devised by the Early and Daniel Company, 525 Carr Street, Cincinnati, Ohio, converts into a hanging feeder merely by cutting a few perforations on the side of the package. It is colored to look like tree bark and green leaves, and is being distributed through chain and pet stores. It is clever, but it would appear necessary to hang it in a sheltered place because it does not appear to be weatherproof.



Lightweight Tent

"Go-Lite" is the trade name that Morsan Tents, 10-27 50th Avenue, Long Island City, New York, gives to a new addition to its varied line of tents. This is designed for the hiker and backpacking camper. It is made of combed airplane cloth, which is highly water and mildew resistant, has an insect-proof netting door, is 8 by 8 feet with a six-foot center height, and has an aluminum telescoping pole and aluminum stakes. The Morsan handbook and catalog is available on request.

Scaling Fish

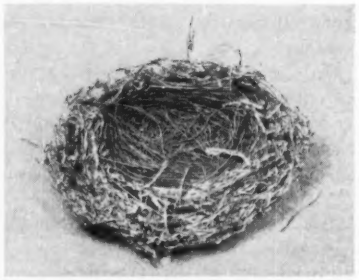
Many housewives dread the task of scaling fish that the family's anglers bring home. Fred Arbogast Co., 315 W. North Street, Akron 3, Ohio, think they have the answer in their Water-Jet Fish Scaler. A special nozzle attaches to any garden hose and produces just the right stream of water to lift the scales quickly and without damage to the skin of the fish. A two-way clamp holds the fish. This item is $1.98.

Choice of Power

Flick the dial and you shift from a 7-power binocular to a 12-power; flick again and you are back to 7. This Bi-Powered Binocular is announced by United Products Company, Department NM, 9043 S. Western Avenue, Chicago 20, Illinois. With carrying case, neck and case straps, it sells for $49.95 plus the usual 10 percent Federal excise tax. United is so proud of this one that they offer a 30-day trial and refund if not thrilled with the performance of this instrument.

"Litterbug" Emblem

Above is one of three optional forms of the "litterbug" emblem adopted by Keep America Beautiful, Inc. The two other forms differ only in the arrangement of the lettering around the central figure. In creating this emblem KAB is indebted to the National Council of State Garden Clubs, which devised the original reprehensible character who is here somewhat adapted to KAB objectives. All cooperating sponsors of this anti-litter program are authorized to use this standard design, as are all cooperating organizations. Further information is available from Keep America Beautiful, Inc., 99 Park Avenue, New York 16, New York.



Foil for the Birds

In order to thwart radar beams Air Force planes drop narrow strips of aluminum foil called "chaff." This gave at least one bird an idea for special nest decoration. The nest was found by Mrs. Victor Metcalf of Cortland, New York, and sent in to Reynolds Metals Company, manufacturers of aluminum foil. Mrs. Metcalf said she thought the bird that built the nest was a sparrow, probably meaning the so-called English sparrow. The Reynolds public relations department observes that "certain members of the bird clan are said to emit radar-like beams to help them find their way, and maybe this one is protecting its home." In any event, they add, the bird was mighty smart because foil reflects as much as 95 percent of the sun's heat.

Bird Slides

While he was teaching biology J. W. Thompson of Seattle was bothered by the fact that he was not able to get good slides of birds of the Northwest for use in his work. Upon his retirement he decided to do something about it. So he enenlisted the cooperation of Zella Schultz, an ardent bird student and artist. Between them they have completed a set of 125 colored Kodachrome slides of common birds of the Northwest. These are beautifully executed and of outstanding value, not only to schools but to all interested in birds. These are sold at 35 cents a slide, or forty dollars for the complete set of 125 subjects. Mr. Thompson has also prepared two special sets, accompanied by an exhaustive script, one of fifty birds west of the Cascades and one of fifty birds east of the Cascades. These sell for $17.50 per set, or $10 on a filmstrip. Since many of the subjects are not exclusively birds of the Northwest, they have a far wider interest than just in that area. Mr. Thompson, who lives at 5245 20th Avenue South, Seattle 8, Washington, will be happy to supply data.

Brookgreen

(*Continued from page 516*)

to cure toothache and rheumatism. When the inner bark is placed in the mouth, in a few seconds one's tongue and gums tingle and burn, and then become quite numb, quite like the effect of novocain.

The forests are like a primitive wilderness in their solitudes. Indeed, to return to the primitive is the primary purpose of the Brookgreen Sanctuary! Here mammals, birds, trees and other plant life flourish unmolested by man. The principal trees of the forest are longleaf and loblolly pine, oak, cypress, tupelo, maple, and magnolia, and many other less numerous species. Deer, raccoons, opossums, squirrels, foxes, wild cats, and many species of birds find the forests and marshes a safe retreat and habitat, being found in increasing numbers. Alligators, nearly extinct in many sections of the South, are plentiful in the marshes and rivers of Brookgreen. They are seen swimming slowly along the shallow sloughs and marshy lakes, or sunning themselves on the banks of the creeks and rivers. These, too, are a lure for poachers, seeking to shoot the reptiles for their hides.

Deep within the shadowy solitudes of The Oaks plantation, now within the Brookgreen domain, there is a small family burial plot, the Burr-Allston cemetery, protected from the encroaching forest by a stone wall. Here, in vaults under huge cypress trees, from which streamers of moss hang in mourning, are buried many persons famous in the history of the South. The Allston family was a notable one. William Allston, 1738-1781, was a Captain in the band of General Francis Marion, the Swamp Fox, the terror of Cornwallis, and on many a dark night they rode their swift horses through the forests of The Oaks and Brookgreen. Washington Allston, 1779-1843, born at Brookgreen, was often called the father of American painting. Joseph Alston (who dropped an "l") married Theodosia Burr, daughter of Aaron Burr, in 1801, and in 1812-14 was Governor of South Carolina. Theodosia left The Oaks in December, 1812, and set sail on the schooner *Patriot* from Winyah Bay at Georgetown, to meet her father in New York. The ship was never heard from again, and it was never known whether it was lost at sea or captured by pirates. The cemetery is no longer opened to the public, and was viewed by the author by special permission.

Mr. Huntington founded two other refuges before establishing Brookgreen. His own words tell the purpose of these, in part: "Brookgreen Gardens is a quiet joining of hands between science and art. . .These gardens form the final link in a chain of three wild refuges: the first in the Adirondacks in New York consisting of about 16,000 acres of forest and lakes; the second at Newport News, Virginia, devoted to the study of the sea, which, though smaller, reports extraordinary numbers of birds resting there and later continuing their annual flight to Brookgreen, Florida and South America."

Mr. Huntington died in December, 1955, but Brookgreen is a living monument to his memory, and a rich heritage to lovers of Nature.

Cormorants

(*Continued from page 527*)

whistle, to enter the pond and return to land only when so directed. To this end a bamboo cane, that potent instrument of all Asiatic education, becomes a lively stimulant. Eventually obedience becomes habitual; they get used to wearing a collar on their necks, and to life on a perch when not fishing for their keep. Cormorants, by the way, are one of the few web-footed birds capable of perching with ease and security.

Interesting data on cormorant life in captivity are found in George Freeman's *Falconry*, published about a century ago. Freeman, an English sportsman, trained several Dutch cormorants, and did his best to revive the sport of cormorant fishing, which thrived both in England and France during the 17th Century.

How profitable the ancient cormorant fishing business of China is I cannot say, but in consideration of the cost of training and feeding the birds, which have voracious appetites, the profession can be none too lucrative. But cormorants really are in the money in Peru. The Guanay cormorant which, except for its white breast, closely resembles the Chinese and Japanese species, is probably the most valuable wild bird in the world. It is, you know, the source of Peru's immensely valuable guano deposits.

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THE Nature CAMERA

By EDNA HOFFMAN EVANS

Photographic Christmas

PERHAPS IT IS ALMOST TOO LATE to be mentioning the fact that now is the time to put the finishing touches on photographic Christmas cards intended for mailing this holiday season. Time is short but, after all, there has been plenty of warning. As early as August and September the greeting card dealers began their Christmas selling campaigns—at a time when the weather was much too warm for any thoughts of fur coats, reindeer, or fireplaces. I watched one small advertising Santa Claus, made of wax, melt down to a red grease spot in the summer sun. But he did not melt in vain. Numerous shoppers placed their Christmas card orders early with the merchant in whose display window he perished.

Stationery stores are usually ahead of the photo shops so far a Christmas card sales campaigns are concerned. Possibly this is because photo supplies are more perishable. At any rate, the camera shops never give us photographers as much advance warning as the stationers do.

Waited too long

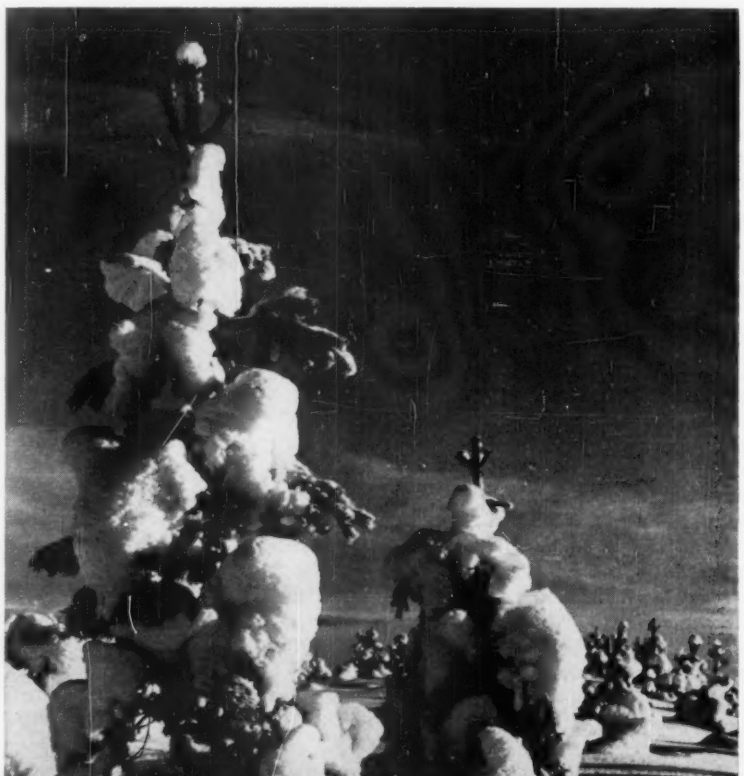
Three years ago, I recall, I let things go until after mid-November. Then I had a difficult time finding deckle edge enlarging paper. There was still plenty of contact paper available, but that would not serve my purpose. I searched the town over before finding a dealer who still had a stock of the paper I needed.

Last year, having learned by experience, I bought my paper early, and encouraged my friends to do likewise. Three of us worked out an assembly line process, and, along about Thanksgiving, we devoted an entire day to producing Christmas cards. I ran the enlarger. One friend presided over the developer tray and moved the prints into the intermediate wash. The third member of our trio shifted the cards from the middle tray into the hypo and then, in due time, into the final wash. It was a machine-like routine that worked out well.

This year, a chance visit to my photo dealer's shop in September started me on my present Christmas card program. Even before that I had been toying with the idea of using color prints in some sort of a folder. The Eastman Company must have read my mind. At any rate, this year for the first time I found Christmas greeting folders with various sized openings inside to serve as masks around color prints. Or, if one does not choose to use a color print in the folder, a print toned green, or blue, or sepia, would be appropriate. Color prints make the individual cards a bit more expensive, but certainly they are attractive enough to be worth the difference. The new folders are a boon to color photographers who, up to now, have been the "forgotten men" of the photographic Christmas card business.

Aid to ideas

For people whose originality needs a little bolstering, there are two Kodak publications readily available in the greeting card line. One is the 25-cent pamphlet, punched for inclusion in the Kodak Photographic Notebook, entitled "Photographic Greeting Cards." The other is the 35-cent "Ideas for Photo Christmas Cards" (Kodak publication No. G-11). Both are filled with ideas, suggestions, and how to-do-it information. Most general books on photography include a greeting card chapter, too.



Appropriate for the Christmas season is this picture of "Young Pines in Snow," taken by Anders Sten and entered in the Chicago International Photography Exhibition.

In addition to finishing Christmas cards, December has also become the month in which Nature photographers should be thinking seriously about the entries they plan to send to the International Nature Photography Exhibition sponsored by the Nature Camera Club of Chicago and the Chicago Natural History Museum. The coming exhibition will be the twelfth annual affair.

This year, as in the past, any photographer may enter four slides and/or four prints. Entry fee for the slides is one dollar, and for the prints one dollar plus postage. There will be ribbon and medal awards for the winners. Deadline for the coming exhibition is January 19, and the accepted entries will be on display February 2-24 at the Chicago Natural History Museum. Entry forms may be obtained from Mr. H. J. Johnson, 2134 Concord Place, Chicago 47, Illinois.

Some years ago, when I first became interested in the Chicago Exhibition, it was one of the few such devoted exclusively to Nature photography. Since then, however, a considerable number of camera organizations have begun to sponsor Nature photography contests or contests with special Nature divisions. The growth of interest in such competitions is a good sign, I believe. It indicates that more and more people are finding relaxation in a photographic hobby. Through this hobby thousands of people are becoming increasingly appreciative of the natural beauties to be found in this country. They are also realizing the need to protect and preserve these beauties for the benefit of generations to come.

Lure of contests

Why do amateur photographers enter contests when the prize is merely recognition or a ribbon of some sort? What is it that makes us photographers tick? Psychologists say that the drive for recognition is one of the basic motives that urge us human beings on. Everyone wants to be important somewhere. So those of us who like to take pictures band together into Camera Clubs to see whether one individual can take better pictures than the next fellow. Then we raise our sights, broaden our horizon, and want to excel not only in our own group but in a wider sphere. Thus is born the regional contest, and finally those of national and international scope. In the Chicago contest, for example, prints and slides will be sent in by photographers all over the world. Mere acceptance is a photographic accolade, while an honorable mention or a prize is a distinction of which to be proud.

Once a person has sent work to these contests a time or two, his name is included on numerous mailing lists and notices of other contests begin to find their way into his mail box. For readers who have never competed before, this coming Chicago exhibition is a good place to begin.

For color photographers who take their viewing seriously, the new plastic masks for the Kodak Transparency Illuminator would be a useful gift. The masks are available in five different models to fit transparencies from 2 x 2 up to 8 x 10.

Returning to the subject of Christmas—what is new or desirable in the gift line for photographers?

Cameras as gifts

As usual, the camera and photo supply manufacturers have prepared a number of gift boxes, sets, and combinations. The buyer must judge for himself which camera or which set of accessories best fits his desires

Kits like this are favored Christmas gift items in the photography line. Included here is a camera, a field case, flashholder and clip-on flashguard.

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and his pocket book. Generally speaking, the price is a good criterion of value; the better and more versatile equipment is, the more expensive it tends to be. On the other hand, a few dollars spent on a simple, inexpensive camera will sometimes open vistas previously undreamed of to the photographic beginner.

At the risk of seeming ultra conservative, I would advise the non-photographically informed purchaser to stick with well known names and standard brands—Eastman Kodak, Ansco, Bell and Howell, Kalart, Argus, Nomad—to name a few. Let the advanced amateurs and the super-enthusiasts haggle over the merits of various foreign-made products. The manufacturers in this country do a good enough job for most of us.

Avoid "gimmicks" and novelties if you want to give or receive a useful photographic gift. For example, last summer when I was in New York I noticed that all the novelty shops along Broadway and up 42nd Street were featuring smaller-than-postage-stamp-sized cameras that looked as though they came straight from a cloak and dagger espionage thriller. The shiny little devices ranged in price from a dollar up to two and two-fifty, depending on whether the carrying case was included and how many rolls of the special film were thrown in. I was fascinated until I actually entered a store and examined the cameras at close range. They were not worth the price asked, no matter how small and inexpensive they were. The same is unfortunately true of many so-called gift items and novelties. There are good stamp-sized cameras, but their cost places them not in the toy but in the luxury class.

For the darkroom

A good practical gift for the color photographer who does his own darkroom work is the 16-ounce Kodacolor Film Processing Kit (Process C-22). While it is of value to any photographer, amateur, commercial, or industrial, the new kit is designed particularly for "do-it-yourself" work in the home darkroom. By the simple addition of water to the packages of chemicals, these solutions can be prepared: Two 16-ounce batches of developer, two 16-ounce batches of stop bath, one 16-ounce batch of hardener, one 16-ounce batch of bleach, and one 16-ounce batch of fixer. Approximately sixteen rolls of 828 Kodacolor film, or ten rolls of 127 film, or six rolls of 620/120 film, or four rolls of 616/116 film can be processed by the kit. Instruction sheets are included and the selling price of the kit is $3.85.

For color photographers who take their viewing seriously, there is now available a group of new transparency viewing masks for use with the 10 x 10 Kodak Transparency Illuminator. The devices mask out stray light areas and provide a convenient rack for viewing the transparencies. Made of durable plastic, the masks are available in five different models to accommodate twenty 2 x 2 transparencies, nine 2¼ x 2¼, two 4 x 5, one 5 x 7, or one 8 x 10 transparency.

In conclusion—whether you hope to find a Brownie or a Leica, a filter or a telephoto lens, a pair of darkroom tongs or an enlarger under your tree this Christmas—may your Yuletide season be a happy one.

Sea Lions

(Continued from page 519)

cestral home of his kind.

"He wins, boys," said the skipper with admiration. "Let's go."

So we turned and made for the entrance. Just before we squeezed through between waves, we looked back. The giant sea lion had not budged an inch, and as we slid through the hole the great room behind us burst into reverberating sound. It was the King telling the sea lion world of his victory, in a grand triumphal anthem.

An hour later, when the *Seyelyn* pulled up anchor and rounded Point Diablo, we seemed to be transported back to the familiar surroundings we knew. Gone was the black gash in the cliffs; gone, too, the somber grayness. The sun came out to blue the sea, the waves sparkled around us, and overhead the fog broke into tenuous white filaments against a clear bright sky. But we could not immediately adjust ourselves to normal things. For some time we found ourselves mentally going back into that deep, dark cavern for another audience with the mighty King and his subjects.

Since then I have never met anyone who has visited Painted Cave, and only two or three who have heard of it. But if I ever run across anyone who plans to go, he can count on me as a companion—definitely. For I have a hankering to know if His Majesty still lives and rules in the Cave of the Sea Lions.

Are You A Nature Detective?

(Answers pages 529-533)

1. A glance up the tree, its top broken by a hurricane, reveals a flicker engaged in house-digging activities.
2. The pileated woodpecker has been at work.
3. The ocean winds have been shearing the trees.
4. The tracks, almost in a straight line, indicate a ground bird that was walking, not hopping. It was a pheasant.
5. It proves it was a pheasant for we see the tail marks pressed in the snow.
6. A crow has been this way, dragging its hind toe in the deep snow as it took each step, and left its wing prints as it suddenly took off. And a rabbit left signs of one of its hops in the foreground, hopping fast for its back feet landed in front of the prints made by the forefeet.
7. No, the wind has passed that way.
8. A mouse with a long tail has left a record of its travels.
9. The sap drops show that the tree was sawed recently. The rings show that the oak grew rapidly for the first 35 years of its about 160 years. Also the wood during the last 50 years is much lighter than the older heartwood.
10. It might have been bent by Indians as a trail marker, or by earlier settlers as a line marker. Or there may have been a falling tree to deform it. "As the twig is bent, so is the tree inclined."
11. Yes, to both clues.
12. An insect ate it, perhaps when the flower was still rolled in bud as we fold paper and snip out a snowflake or star design.
13. The layers of shale indicate that the land here was once under water.
14. From the rings you can deduce that the twig is two years old.
15. Yes, a litterbug has been this way.
16. A ruffed grouse left its droppings.
17. A gall insect has built its home on the pussy-willow, and when the knife cut open the swelling it exposed the larva of the gall-fly.
18. Many scuff marks of juncoes and white-throated sparrows showed where they had been foraging for seed.

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Bulletins

"Raising Bait Fishes" is a 124-page, illustrated booklet, prepared jointly by John Dobie, O. Lloyd Meehan, S. F. Snieszko and George N. Washburn and published as Circular 35 of the U.S. Fish and Wildlife Service. It is available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. for 45 cents.

"Self-Guiding Auto Tour of Yosemite National Park" by Richard P. Ditton and Donald E. McHenry is a 52-page illustrated booklet that has been worked out over a period of years and that enables the visitor to Yosemite truly to get acquainted with the park without a guide. It is published as a special edition of *Yosemite Nature Notes* by the Yosemite Natural History Association, Box 545, Yosemite National Park, California. Annual subscription $1.50.

"People and Timber" is a condensed summary of the information contained in the U.S. Forest Service's Timber Resources Review. It is published as Miscellaneous Publication 721 of the Forest Service and available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. for 20 cents.

"An Evaluation of Wildlife Resources in the State of Washington" by Robert F. Wallace is a 64-page report published as Bulletin No. 28 of the State College of Washington, Pullman, Washington, and sold for one dollar.

People specially interested in park work will find illuminating the report of 25 years of development and service issued by the Hamilton County Park District, 1000 Miles Road, Cincinnati 31, Ohio.

"Handbook on Lawns" is a 94-page, illustrated symposium on lawns, their creation and care, published by the Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn 25, New York, at one dollar.

"Secrets of Life" is a "comic" book treatment of Walt Disney's True-Life Adventure by the same name. It is a step forward in publications in this field, and is brought out by the Dell Publishing Company, 261 Fifth Avenue, New York 16, N.Y., for ten cents.

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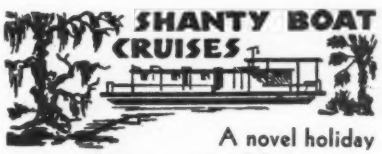

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Migrants

(*Continued from page 524*)

could rival these dipterous movements, either in the intense impetuousity of their flight or in the great numbers involved.

One of these prodigious fly migrations occurred at Rockaway Point. As the afternoon advanced, there was an actual migration of many thousands of a dipterous population from one geographical area to another.

At first, early in the afternoon of October 7, 1926, the air above the grass-grown dunes became moderately populous with a scattering advance of dark-bodied flies approaching from the east. Soon more numerous fliers appeared. Hastening their pace, they combined with ever-increasing newcomers to form a great, rushing multitude. Wildly dashing elements of these hordes were accompanied by zigzaging individuals, or by more steadily boring, bullet-like migrants that virtually shot through the air. These were the numerous flower flies. Multitudes of smaller fliers seemed possessed by the same overwhelming desire to move westward, and excitedly accompanied the hastening throng. And ever-new companies, arriving from the east, continued without cessation the remarkably animated scene.

Among various examples of the large flower flies were the ubiquitous *Eristalis tenax*, and such species as *Syrphus ribesii*, *Syrphus wiedemanni*, *Eristalis transversus* and *Helophilus fasciatus*. The small *Allograpta obliqua* was well represented, while many small examples of the Muscidae, like the biting house fly, were also present. It was a true cosmopolitan exodus.

When first observed at 1:45 P.M. the flight announced itself at once as a rare phenomenon. So I prepared to investigate. An extended examination showed that this winged cloud was advancing on a broad front of about 380 feet, although there seemed to be two main streams of migrants separated by an unoccupied zone where the violent wind had swept the beach bare of flies. So our migrants had sought protected channels between the more favorably situated ranks of dunes, just as they do elsewhere on the Island and in New Jersey. Probably a total of 270,000 flies passed over the area under observation from the time of my arrival until my departure at 4:40 P.M. Even at that late hour a more moderate flight was in progress, and continued, as always before, to the beach extremity. From thence the flight disappeared far out over the channel waters toward the west.

Similar autumnal behavior, but on a much smaller scale, had already been reported in early European literature. On September 2-4, 1880, Professor Doctor Eimer had seen many *Eristalis tenax*, and another species of flower fly, flying W.S.W. along the valley of the Engadin in Switzerland. And although dragonflies accompanied the swarm, as they do so often on our beaches, the fly migration was particularly arresting because of the numbers involved, the impetuosity of the flight, "as if the insects were driven by some magic power," and because of the rarity with which such phenomena has been observed in Europe.

Recently our own early observations, long viewed with widespread and even violent skepticism, have received specific support through an expedition sent into southern France by the Rothamsted Experimental Station of England. There, Dr. C. B Williams, stimulated by work in this country, has conducted extensive observations on migrant insects. And, following this French expedition in 1953, he reported to the writer that numerous migrations of flies had been seen passing through the Pyrenees into Spain. The genus *Eristalis* was represented, also *Syrphus*, and examples of the Calliphoridae, all noted in the June, 1926, issue of the *Journal of the New York Entomological Society* as regular autumn migrants here. These observations show a remarkable correspondence between the dipterous migrations in Europe and those which have been observed so long in this country. Yet it is nothing more than we should expect. The curious fact is that such findings could have been so long delayed.

Even so, the questioning reader may ask: "What practical benefit can result from all these patiently gathered observations?" A significant answer can be emphatically offered. If it is true, as one of our ablest dipterologists, Dr. S. W. Williston, stated many years ago, "that we may justly say that this order, so far as man is concerned, is the most pestilential of all animal life," then any addition to our knowledge of fly behavior is important. And such far-reaching and dubious activities as these studies reveal may well cast a light on the origin and extension of epidemics otherwise lacking an explanation. For example: the larva of the screw-worm fly burrows in the wounds of cattle, and does much damage. More rarely it causes the death of a human victim. And this fly, *Cochliomyia macellaris*, is a common migrant along our autumn stations. More importantly, recent studies by Rosenau indicate that our biting house fly, *Stomoxys calcitrans*, so frequently encountered on migration, is able to infect with the virus of infantile paralysis.

Undoubtedly flights of various insects pass unnoticed in many localities because the observer is not alerted to such behavior. So great opportunities for highly original observations should inspire both professional entomologist and layman alike. Both may add valuable data to our as yet far from complete continental picture of the insects that migrate, and their habitual routes of travel.

Beetle

(*Co ntinued from page 528*)

determine the extent of the benefactions that have resulted from Brumus' activities, Mr. Selhime has this to say in the June, 1956, issue of the *Florida Entomologist:* "In the ten months that we have had Brumus, nine complete generations have been reared and the tenth is now in progress. There is much to learn about these beetles, but we believe that they may do considerable good for the citrus and vegetable growers in Florida when they have become established."

Satellite

(*Continued from page 542*)

after sunset, it will set in the west shortly before 1:00 A.M. on December 15.

Jupiter, in Virgo, will rise in the east just after midnight on December 15. It will remain visible for the remainder of the night and will be in the south at dawn.

Observations of the Geminid meteor shower, on December 9 to 13, with maximum zenith rate of 60 per hour, will be somewhat hampered by moonlight.

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Nature AND THE MICROSCOPE

By JULIAN D. CORRINGTON

Photomicrograpy

By ALICE LEFLER

Charleston, Illinois, High School.

The photographic plate has been called the "retina of the scientist."

HAVE YOU ever seen the tubes that carry food and water from the roots of a plant up its stem? Or have you ever seen the millions of tiny animals in just one drop of water? Chances are you have not, because a microscope is necessary to reveal these wonders, and many others, to our eyes. Have you ever thought, though, how marvelous it would be if you could see these minute wonders of our world without having to use an expensive microscope, and without having to have the necessary equipment? Well, someone else has thought of this also—and has done something about it.

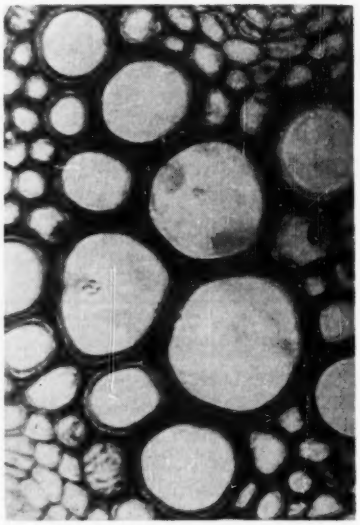
Certain scientists began recording what they saw through their microscopes. At first they drew these records by hand, a difficult and inaccurate method. However, the method did provide permanent records of microscopic phenomena. As soon as photography was invented, it was used to make these records—in a process called photomicrography, defined as the art of photographing a microscopic object, using a camera attached to a microscope. This makes a rapid and accurate means of preserving in detail every feature of the object under the microscope.

Equipment

The only equipment needed to make photomicrographs is a microscope, a camera, a good source of light, film, and material of which to take the pictures. The microscope must be a good one if one is to get good pictures. Its power should depend upon the type of thing one wishes to photograph and how much experience he has had in the field. The camera equipment needed is simple. It includes a light-tight box or bellows, a holder for the plate or film, a front board carrying a light trap to fit over the microscope eyepiece, and a shutter Lenses are not usually part of the equipment since the microscope lens is used instead of the camera lens. The support is usually a steel post attached to a heavy metal base. This may be either horizontal or vertical or adjustable to either position. For a source of light, a gooseneck lamp may be used, but better results may be obtained using a projector to concentrate the light on the mirror of the microscope.

Glass plates were formerly used for taking these photographs because it was thought that film would not lie evenly in the holder, causing distortion of the image. However, cut film does lie flat, and is much easier to use. With glass plates one always runs the risk of breaking them. They also take up more room in storage than does cut film, so plates are almost never used now. Usually, individual film holders are used rather than film packs, so that one can take one photograph and develop it immediately to determine whether a retake is necessary. Photomicrographs are made on both color and black-and-white film.

Crystals of acetic acid.



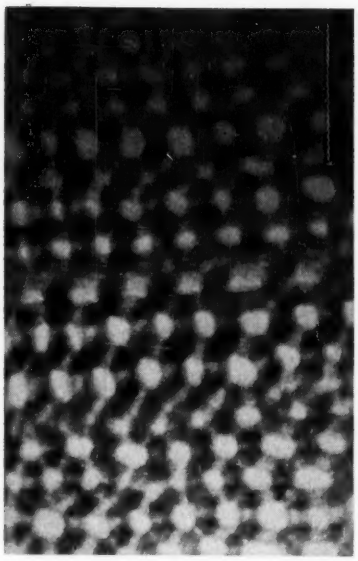
Food and water tubes of a plant root.

The material of which to take the pictures is anything that fits under a microscope. Zoological, botanical, and histological specimens are always good subjects. There are also several special fields of the art, including photography of crystals; of metals and wood; of textiles; of plankton and diatoms; of handwriting, paintings, and bloodstains; and of insects and small animals.

Using these few and simple materials one can get good photomicrographs. These provide accurate, permanent records which can be studied at any convenient time or place. By using long exposures, images can be recorded which are too feeble for visual examination. Also, cinematographic records can be made of rapid changes.

Do-it-yourself

Possibly you might like to take some of these photomicrographs. The procedure is really not very complicated. The first step should be reading about photomicrography. *Amateur Photomicrography*, by Alan Jackson, and *Photomicrography*, by Charles Patten Shillaber are excellent books on the subject. Next, collect the apparatus you will need as described earlier in this article and in books you may read. You will then be ready to take the photographs. Some experimenting will be necessary to determine such things as the best film to use, and the correct exposure. You will probably want to take photomicrographs of both prepared slides and of slides you make yourself. The above is a brief out-



Cross-section of wood.

line of the procedure which I worked out in obtaining the accompanying photomicrographs. All of these photographs were taken with a Kodak, 2¼ by 3¼.

The photograph of the food and water tubes of a plant root, besides showing the tubes very well, is a pretty design. It was taken on Plus-X film for an exposure of 1/5 second, at f:4.5.

The picture of the cross-section of wood was taken on Plus-X film for 1/5 second, f:4.5. To understand more clearly what this shows, think of felling a tree and looking at the cross-section of the log—this is how a very, very small section of it would appear when magnified forty times.

The photograph of crystals of acetic acid was taken on Plus-X film for ½ second, at f:4.5. To get this picture I put a drop of acid on a slide and let it crystalize. I then put it under a microscope and photographed it.

All in all, photomicrography is a very interesting field, whether one participates in it actively or passively; as a hobby or a profession. I believe that if you go into it, you will soon find many new roads opening up to you, and you will find enough things you will want to do with it to fill a lifetime.

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Book Reviews

Microbiology, An Introduction, by Ernest Gray. Philosophical Library, Inc., 15 E. 40th St., New York 16, 1955. $3.75. Pp. xii, 175; figs. 25.

A little book that packs a great deal of information on the study of microorganisms between its covers. The author uses the term *Microbiology* in its correct sense, and not as a synonym of bacteriology as has been done so frequently of late. There are chapters on viruses, bacteria, fungi, algae and protozoa, and under each the reader finds material on habitats and ecology. Separate chapters deal with the microbiology of soil, of inland waters and the sea, and on applied studies, as the retting of flax, the preservation of food and milk, and the preparation of beer, wine, and silage. The biology, culture, and control of microorganisms are discussed.

Mouse

Biology of the Laboratory Mouse, by the Staff of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine, ed. by George D. Snell. Dover Publications, Inc., 920 Broadway, New York 10, 1956. $6.00. Pp. xii, 497; figs. 172.

This reprint of a 1941 Blakiston book was financed by a grant from the John and Mary R. Markle Foundation, and makes a wealth of information available to the present generation of research workers who use the mouse in any of the countless ways in which it is employed in the modern laboratory. In order to keep the work within reasonable bounds, such divisions as anatomy and endocrinology have been omitted. The first chapter is a lengthy and well organized one on embryology, followed by one on reproduction, both by the editor. Then comes histology, genetics, experimental breeding, parasitology, infectious diseases, and maintenance, interlarded with five chapters on the role of the mouse in cancer research.

This is specialized material, of course, not for the general reader. But it brings together a widely scattered wealth of information of vital concern to those on the battle-front of the war on cancer and other diseases and to those interested in the findings in pure science in such fields as embryology and genetics. As Dr. Snell remarks in the Preface, "Because it deals with the mouse alone, this book presents a vertical cross-section (sic) of biological knowledge rather than the more usual horizontal cross-section," which approach has many advantages. Recommended to all who could use a book on such a subject.

By the Jaques

Are you familiar with the lovely Nature and travel books by the Jaques? We have been rereading some of these lately and are moved to remind our readers of these titles: *Canoe Country*, *The Geese Fly High*, *Birds Across the Sky*, *Snowshoe Country*, *Canadian Spring*, and *As Far as the Yukon*. The author is Florence Page Jaques and the artist is Francis Lee Jaques who, at least in our roster, is tops among Nature and particularly bird illustrators today. These are all delightful tales by the flower-and-garden-loving Mrs. and bird-and-railroad-doting Mr. of this author-artist combination. They roam over America and you go with them and share in their delight in many a wilderness experience. For details and prices write Harper & Brothers, 49 E. 33rd St., New York 16.

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—The Village Blacksmith

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Notes

Antilles Animals

"Birds and Fish of the Netherlands Antilles" is a twenty-page booklet illustrated by color and black and white, with text prepared by Henry H. Collins, Jr. It is available for thirty cents in stamps, to cover handling and mailing, from the Netherlands West Indies Tourist Bureau, 475 Fifth Avenue, New York 17, New York.

Elk Film

Announcement is made by Walt Disney Productions, 2400 West Alameda Avenue, Burbank, California, that "The Olympic Elk," one of the notable True-Life Adventures, has now been released in 16mm sound, making the fourth in this series thus to be made available. Details as to the long-term lease arrangement may be obtained from the 16 Millimeter Film Division of Disney Productions.

Musical Door

Swiss ingenuity has always amazed us, and the latest evidence of it to come to our attention is a "Swiss Musical Door Attachment" that is imported and distributed by Walters Modern Hobby Shop, 207 French Road, Utica 4, N. Y. This gadget plays eighteen notes of one of many songs, and can be had to greet visitors with a variety of tunes, about which the importers will be happy to advise you. We were interested to learn that among the most popular tunes are "Home Sweet Home," "My Old Kentucky Home," "Home on the Range," "Bless This Home," which would seem to indicate that we are still a home-loving people.

Virginia Gardens

April 20 through 27 have been chosen as the dates of the Twenty-fourth Annual Historic Garden Week sponsored by The Garden Club of Virginia, Jefferson Hotel, Richmond 19, Virginia. Notable gardens are visited, and a detailed guide book to the tour will be mailed to all interested, on request.

Bird Collection

Some 20,600 birds of Asia have been received by the Chicago Natural History Museum. This is a huge collection and has been known to ornithologists as the Koelz Collection since it was gathered over the years by Dr. Walter N. Koelz of Waterloo, Michigan. The purchase will fill gaps in the museum's present collection and open the door to research by the Division of Birds.

In Latin America

There is great need for vigorous conservation activity in Latin American States, reports Dr. S. Dillon Ripley, Secretary of the Pan-American Section, International Committee for Bird Preservation, following his return from a visit to seven South American countries. Venezuela is taking action, but in Brazil it was found that the future of protection depends on the expansion of that country's national park system. Publicity and public education are sorely needed. Argentina was found to be well organized and capable of taking vigorous action. Destruction of the *Araucaria* forests in Chile and epizootic among the population of Chilean pigeons are serious. Peru has a program of protection of its guano industry and the birds involved, but there is no move on foot to create national parks or reserves. Ecuador badly needs a park system and protection of the fauna of the Galapagos Islands, a need recognized by discussion and resolution at the recent General Assembly of the International Union for Conservation.

Telescope Manual

Bird students, conservationists and others interested in telescopes and their use will welcome the new, 48-page manual, "The Telescope." Main sections have been devoted to outlining the use of telescopes in Nature study and the problems involved in selection of the right telescope for every purpose. Chapters also cover the use of telescopes in astronomy, photography, target shooting, and for "just looking." Copies are available from Bausch and Lomb Optical Co., 635 St. Paul Street, Rochester, New York. Ask for Manual G-36.

Weyerhaeuser Parks

In 1941, on its St Helens tree farm, the Weyerhaeuser Timber Company opened its first public park, twelve miles east of Castle Rock in the State of Washington. This was in reflection of a policy favoring multiple use of forest areas. From this start of one park and a few hundred visitors, the company's program has grown to fourteen parks in 1956 with close to 100,000 visitors. Facilities provided at the parks include picnic tables, fireplaces, piped water, rest rooms, free firewood and cleared areas for games. Fishing and swimming are available at most of the parks, and overnight camping is permitted. Information about these areas is available from the public information department, Weyerhaeuser Timber Company, Tacoma, Washington.

Personals

Lemual A. ("Lon") Garrison, for the past two years the National Park Service's chief of the Branch of Conservation and Protection, is taking over the responsibility of superintendent of Yellowstone National Park. Edmund B. Rogers, for 20 years in charge of Yellowstone, will devote himself exclusively to an extensive historical research project. . . Kenneth D. Morrison has resigned as vice-president in charge of public relations for the National Audubon Society to become director of the Mountain Lake Sanctuary and Singing Tower at Lake Wales, Florida.

New National Park

With the signature of President Eisenhower a bill authorizing the establishment of our twenty-ninth National Park became law. This is Virgin Islands National Park, which will include some 10,000 acres on the island of St. John and adjacent rocks and bays. Creation of this park is made possible through the generosity of Laurance S. Rockefeller, who has already acquired for donation to the U.S. Government more than 5000 acres.

F.W.O.C. Meets

Wilderness matters, including the new Wilderness Bill, occupied the attention of the Federation of Western Outdoor Clubs at its recent 25th annual convention. Just returned from Alaska, Olaus Murie discussed the esthetic values of wilderness, saying: "Wilderness is not just an area but a human experience. Explorers, while starting with the urge to climb mountains or to fill in blank spaces on maps, develop esthetic feelings, as shown in their writings. Protection of wilderness means enrichment of civilization."

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(*Gen.* indicates a general article; *fig.* a photograph or drawing; *rev.*, a review; *port.*, a portrait.)

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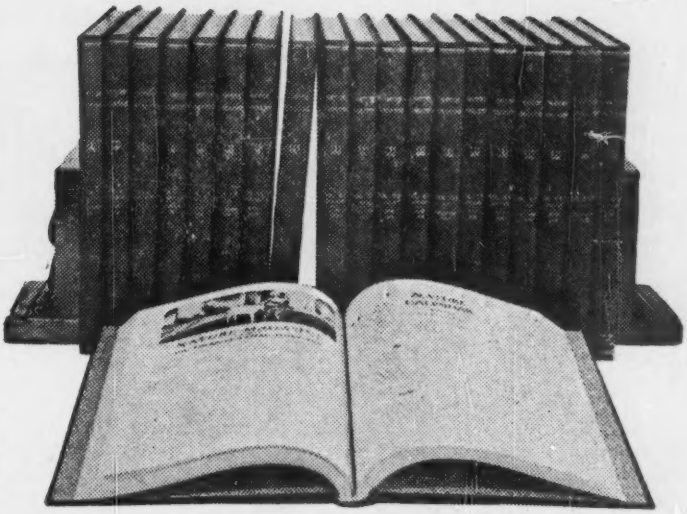

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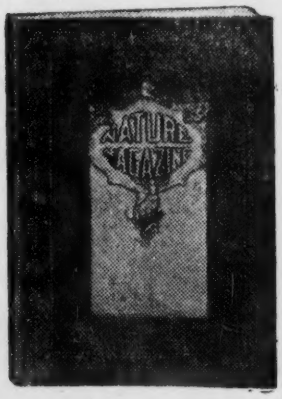

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